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PART 3 – ELECTRICAL SYSTEM

1. Scope

1.1. Part 3 defines the requirements for the escalator electrical system, over and above the general requirements stated in Part 1. The technical requirements for the electronic tags, which store step identification data, are described in Part 2, clause 4.6 of this specification. The electronic tag system shall be independent of the escalator control system.

2. Escalator power supply

2.1. The escalator shall operate from a nominal 400Va.c. 3 phase and neutral 50Hz supply. The *Employer* will confirm the source and tolerance levels of the supply at the time of placement of the contract (see section 11 and site-specific documentation).

2.2. The escalator drive and control system shall be capable of withstanding a voltage drop of 30% for 400ms (or better), where the escalator is carrying passenger loads, not in excess of 50%.

Note: This is to enable the escalator to 'ride through' the vast majority of power system faults remote from the site.

2.3. Refer to annexe.

2.4. Refer to annexe.

2.5. Refer to annexe.

2.6. Refer to annexe.

3. Power rating

3.1. The drive motor and control system shall be of sufficient power kW rating to meet all operational and testing requirements. In particular, the motor and drive and control system must be able to recover the maximum weight test load (i.e. start in the 'up' direction under full load, at normal operating speed, at minimum ambient temperature), several times, allowing for brake adjustments to be made and the test to be repeated.

4. IP rating

4.1. All electrical equipment shall be rated to a minimum of IP55 to BS EN 60529, with exception of the following:

a) High heat output components, which shall be rated at a minimum of IP54;

b) Encoders, which shall be rated at a minimum of IP65;

c) The escalator status indication panel in the station operations room (if required), which shall be rated at a minimum of IP23.

5. Electromagnetic compatibility (EMC)

5.1. The method of achieving EMC compliance within a railway environment is described in Part 4, section 9 of this specification. For documentation requirements – see Part 1, sections 11 and 12 of this specification.

6. Earth bonding

6.1. All earthing and equipotential bonding shall meet the standards cited in BS 7671 (see clause 29.1.1 below).

6.2. The *Contractor* shall provide site-specific earthing drawings and calculations.

6.3. Refer to annexe

6.4. Refer to annexe.

6.5. Refer to annexe.

7. Safety and stop devices

7.1. General requirements

7.1.1. In relation to the design to prevent combined failures of hardware or software malfunction, the *Contractor* shall provide evidence of Notified Body approval in the form of Certificates of Conformity.

7.1.2. Following award of contract, the *Contractor* shall provide the procedure for periodic testing of electric safety devices that are not self-checking. These tests shall be practical to implement and shall not permit the escalator to be returned to service in an unsafe condition. The procedures shall be included within the operation and maintenance manual.

7.1.3. Photoelectric (optical) sensors shall not be used.

Note: The use of 'optical' safety devices is prohibited in the *Employer's* environment because experience has shown that dust and dirt build-up on the outside of optical devices causes spurious tripping, with the resultant risk of passenger cascade falls and service disruption.

7.2. Field bus systems

7.2.1. Field bus systems can be used to communicate safety critical information, but they shall not be used to replace the hardwired safety line.

7.2.2. Where field bus systems are used to communicate safety critical information, the system shall conform to, or better than, the safety measures provided by a Type 3 field bus described in IEC /TR 61158. The *Contractor* shall demonstrate that the level of safety is equivalent to, or better than, that with hardwired systems, or that the bus system is supported by a hard-wired safety system.

7.3. Programmable Electronic Safety Systems (PESS)

7.3.1. Where programmable electronic safety systems (PESS) are used to implement safety devices, the *Contractor* shall:

a) Declare all such safety devices;

b) For safety devices required by BS EN 115-1, confirm that the safety integrity level (SIL) used is in accordance with BS EN 115-1;

c) For any safety devices that are over and above the requirements of BS EN 115-1, provide a statement of the safety integrity level (SIL) used;

d) Provide conformation that the test procedures for PESSRAE, stated in Annex D of BS EN 115-1 have been followed and that the design guidelines have been followed, as stated in Annex E of BS EN 115-1;

e) Provide comprehensive details of Certificates of Conformity provided by the Notified Body for all safety devices that have been implemented as programmable electronics safety systems (PESS).

7.4. Passenger emergency stop switches

7.4.1. Refer to annexe.

7.4.2. Passenger emergency stop switches shall be fitted on the left and right hand side, at the top and bottom of each escalator, approximately in line with the comb, with all push panels facing the escalator.

7.4.3. If the escalator is above 10m rise, additional stop switches shall be fitted on the incline balustrade decking, at a maximum spacing of 15m measured along the decking. The push panels shall face the escalator. The exact spacing shall be arranged such that the position of the stop switches does not coincide with decking panel joints. The number of stop switches on the incline shall be as shown in table 3.1 below:

Note that this exceeds the requirements of BS EN 115-1

Rise	No. of stop switches on incline
<10m	0
≥10m <12.5m	1 on each side of the step band
≥12.5m <17.5m	2 on each side of the step band
≥17.5m <25m	3 on each side of the step band

Table 3.1: Additional passenger emergency stop switches

7.4.4. The space between the stop switches and the handrail shall be not less than 150mm, and no greater than 500mm.

7.4.5. Where passenger emergency stop switches are fitted between two escalators, each pairing shall be aligned.

7.4.6. Refer to annexe.

7.4.7. When the push panel of a passenger emergency stop switch is operated, it shall remain in the pushed position. The red LED (in the lid) shall illuminate and remain illuminated until the push panel is reset. The panel shall be released mechanically, by turning a key in the lid of the switch housing.

7.5. Manually operated stop devices

7.5.1. Emergency stop pushbuttons shall be fitted at the following locations:

a) On the main control cabinet door;

b) – d) Refer to annexe.

7.5.2. Refer to annexe.

7.6. Step speed monitor

7.6.1. Excessive speed or underspeed of the step band shall be monitored by a safety device with suitable resolution.

7.7. Handrail speed monitoring

7.7.1. Handrail speed shall be monitored by safety devices with suitable resolution.

7.8. Missing step devices

7.8.1. The missing step monitoring devices shall be either mechanically operated safety switches or inductive devices.

7.9. Step band anchor interlock switches

7.9.1. Interlock switches shall be provided which prevent the escalator being started while the step band is anchored (see Part 2, clause 10.12 of this specification).

7.10. Stop key switches in Newel ends

7.10.1. Where inverter braking applies, a 'stop' key switch shall be provided at each newel end, as described in Part 2, clause 17.5.1 of this specification. Operation of this key switch shall stop the escalator by application of the mechanical brakes.

8. Protective devices

8.1. The disconnect times of all circuits shall be compliant with BS 7671. Where the safety line voltage is 50V or more, it shall additionally be protected by a manually resettable 30mA RCD.

8.2. The set of motor thermistors on each motor shall be monitored separately and appropriate messages shall be displayed on the controller screen. It shall not be possible to re-start the control system until the temperature has fallen to a safe level.

8.3. Activation of a 'gearbox oil level low switch' while the escalator is running shall not cause the escalator to stop. It shall not be possible to restart the escalator until the oil level is restored to the correct operational level. An appropriate message shall be displayed on the controller screen.

9. Incoming power supply isolation

9.1. A fused isolator assembly, interlocked by a 'Castell' key (or equivalent) mechanism, shall provide independent, safe means of isolation of the escalator electrical system, without interrupting the power to any other escalator. The key type and the precise location of the assembly shall be agreed with the *Employer*.

9.2. The mechanical locking off system shall have the following:

a) A 'Castell' (or equivalent) lock system preventing the isolator being turned on unless the key is inserted and in its locked and turned position. The key shall not be withdrawable unless the isolator is in the 'off' position;

b) The isolator cabinet door shall be interlocked with the isolator so that the door cannot be opened unless the isolator is turned off;

c) The isolator cabinet door interlock may only be defeated by inserting and turning the key in its lock.

9.2.1. The mechanical locking off system shall facilitate addition of padlocks.

9.3. Each isolator shall have a key with a unique key code. The *Employer* shall allocate a unique, escalator specific code for each incoming power supply isolator assembly.

9.4. Integral supply fuses shall provide protection from short circuit conditions. They shall be rated for motor start currents and transformer transient currents, whilst retaining discrimination from the supply fusing.

9.5. For a flight of escalators, isolators shall be co-located and numbered from left to right in ascending numeric order and correspond to the escalator number(s) as detailed in the site-specific documentation.

9.6. The normal duty cycle of the isolator is up to 500 unloaded switching operations, and up to 5 load switching operations per year.

9.7. Performance tests shall be carried out in the factory prior to the isolator being dispatched to site.

9.8. The control system shall be designed to facilitate the LU standard escalator isolation procedures, without any requirements for additional controller actions to restore full functionality. The standard procedures are as described in clauses 9.8.1 and 9.8.2 below.

9.8.1. The standard escalator energisation (start up) procedure is as follows:

a) Insert the Castell key;

b) Switch on the isolator;

c) Switch on the circuit breaker;

d) Start the escalator.

9.8.2. The standard escalator isolation procedure is as follows:

a) Stop the escalator;

b) Switch off the circuit breaker;

c) Switch off the isolator;

d) Remove the Castell key.

10. Drive and control system

10.1. General

10.1.1. The escalator control system design shall use 'open protocol' regarding the supply of all equipment.

10.1.2. Any special tools required to test or change parameters of the drive and control system shall be provided to the *Employer*.

10.2. Drive selection criteria

10.2.1. The control system shall be fitted with a fully rated VVVF drive system.

10.2.2. To assist the full load weight testing of each escalator, the drive system shall be able to achieve 100% load powered recovery without slipping backwards or tripping the overload protection system. This requirement must be taken into consideration during the selection of the type of drive to be used for a specific site.

10.2.3. During each stage of the weight test procedure, the escalator drive and control system shall start the escalator under 25%, 50%, 75% and full load conditions – to recover the tests weights.

Note: It may be necessary to repeat weight tests several times, allowing for brake adjustments to be made.

10.3. Simulation testing

10.3.1. Simulation tests shall be carried out in the factory prior to the drive and control system being despatched to site (see Part 4, section 7 of this specification).

10.4. Inverter drive system

10.4.1. The VVVF drive controller shall satisfy the following requirements:

a) Current limit for acceleration and roll back load limit up to at least 150% FLT;

b) Reconnect facility, for short term or transient under-voltage ride-through spinning load (to synchronise the supply phase with the motor voltage when the motor is regenerating);

c) Programmable acceleration and deceleration characteristics and current or torque limits;

d) Frequency skip setting, to prevent the inverter driving the motor at a speed equal to its natural frequency;

e) Self-protecting for output terminal short circuit;

f) Self protecting and alarm output for any internal fault;

g) Long life rating for the power capacitors in the d.c. link (the component life shall be declared);

h) Integral key pad and clearly legible display (either LED or LCD preferred) for comprehensive parameter setting and monitoring of the unit;

i) Comprehensive alarm and fault self diagnostics accessible to the control system.

10.4.2. The drive system shall be entirely compatible with the control system, so that full communication for both control and monitoring purposes is achieved.

10.4.3. The control system shall automatically select the appropriate drive settings for each mode of starting.

10.4.4. The drive system shall be employed to start the motor in all modes of operation.

10.4.5. The drive system shall be configured to limit the full load starting current to no more than twice the full load running current.

10.4.6. Refer to annexe.

10.4.7. Refer to annexe.

10.5. PLC/Microprocessor control system

10.5.1. Programmable controllers shall meet the requirements of BS EN 61131-1, BS EN 61131-2 and BS EN 61131-5.

10.5.2. The retention of memory settings within the system is a required safety feature. The system shall retain all programs and settings, in the case of a power failure in non-volatile memory. There shall also be a facility to prevent an unauthorised change of settings.

10.5.3. The main control unit(s) shall have the following minimum capability:

a) Real time clock;

b) Fail safe processor(s);

c) Comprehensive alarm and fault self diagnostics for real time historic logging (alarm stack) of at least the last 200 faults;

d) An RS232/RS422/RS485 or Ethernet communication port for monitoring and communication mounted within the controller;

e) Security key and ‘engineer’ level password access facilities.

10.5.4. The safety integrity level (SIL) for any safety relevant software shall be fully justified.

10.5.5. All data transfers between the controller and external diagnostic devices shall be logged and password protected, and shall only be achieved via the serial interface and a portable plug-in unit or Personal Computer. EEPROM or EPROM’s shall be programmed off line. The *Contractor* shall advise the *Employer* of the configuration software package and network communication protocol(s).

11. Power supply harmonics

11.1. Refer to annexe.

11.2. Refer to annexe.

12. SCADA

12.1. The *Contractor* shall fit a communication processor and interface device that enables future connection with the station LAN infrastructure.

12.2. Provision shall be made so that the escalator data, such as alarm records and fault logs, shall be transferred through Industrial Ethernet to a third party SCADA / monitoring device or panel. The *Contractor* shall advise the *Employer* of the options available to communicate with a remote escalator status monitoring device or panel.

13. Braking system

13.1. General

13.1.1. Each drive unit shall be equipped with its own brake, and these brakes shall operate in unison at all times.

13.1.2. For all modes of operation, unless inverter braking is employed, the mechanical operational brakes shall be applied simultaneously, when any stop device is activated, and shall remain applied when the escalator is stationary.

13.1.3. If required, a facility to delay the application of the auxiliary brake, up to a maximum of 3 seconds shall be incorporated. The delay can be achieved via a variety of methods, as long as they are fail safe. The auxiliary brake shall still apply immediately in the event of an overspeed or underspeed, or carriage switch activation.

13.1.4. For all modes of operation, if confirmation of lifting of the braking system is not received within 3 seconds, the start shall be aborted.

13.1.5. A means shall be provided to enable the effectiveness of the brake system to be tested under normal stopping conditions and foreseeable failure modes (i.e. independent activation of operational brake and auxiliary brake). Brakes that can be released by hand shall require continuous application of manual pressure to keep them open.

13.1.6. The testing and setting requirements for the braking system are specified in Part 4, sub-section 12.8 of this specification.

13.2. Inverter braking

13.2.1. Where inverter braking is employed, the *Contractor* shall provide a detailed risk assessment/FMEA. This shall include the following:

a) A listing of all possible failures of each component;

b) Details of those failures that could lead to a dangerous situation;

c) Mitigation measures that have been taken to prevent the dangerous situation arising;

d) Confirmation that no single failure could lead to a dangerous situation;

e) A list of stopping conditions for which inverter braking will not be used.

13.2.2. Hardwired safety timers in accordance with BS EN 60204-1, or a design that can be demonstrated to be equivalent, shall be used as back-up devices to apply mechanical brakes after a pre-defined period of time.

13.2.3. The sequence of application, with the inverter acting as the operational brake, shall remain as described in clause 13.1.2 with the following exceptions, whereby the mechanical brakes shall apply immediately:

a) Inverter failure;

b) Underspeed;

c) Time-out of hardwired mechanical brake safety timers referenced in clause 13.2.2 above;

d) Operation of any safety device when 'test' mode is selected;

e) Escalator overspeed;

f) Carriage switch activated;

g) Power failure.

13.2.4. The rate of sampling to determine the deceleration shall be a minimum of 10 samples per second.

13.2.5. An inverter braking system is the preferred braking method, for normal stopping conditions.

14. Stand-by operation (economy power mode)

14.1. The escalator control system shall include the facility for 'stand-by operation' for slow speed operation during periods of intermittent passenger usage.

14.2. Unless specified otherwise, in the site-specific documentation, the escalator shall detect the entering of a user. Once passenger activity has been detected, the escalator shall accelerate to its normal speed. The escalator shall decelerate automatically to 0.2m/s, for stand-by operation, following no detection of passenger movement onto the escalator for an adjustable period of time. Acceleration and deceleration shall be at an acceptable rate of less than 0.5m/s² to achieve a smooth transition. The parameter settings and method of detection of users shall be agreed with the *Employer*.

14.3. A facility to over-ride stand-by operation shall be incorporated within the control system. Detailed design and password requirements shall be agreed at the design stage.

15. Control selector switch

15.1. A three position switch providing selection between 'normal', 'test' and 'inch' modes of operation shall be mounted on the front door of the main control cabinet and give a clear indication of the mode of control selected.

16. Start-up operation

16.1. Start 'up' and start 'down' key switches shall be incorporated in the upper and lower landing newel boxes (described in Part 2, clause 17.5.1 of this specification).

16.2. With the control selector switch, on the main control cabinet door, in 'normal' position, it shall be possible to start the escalator from the following locations in either direction:

a) Upper landing key switches (newel end);

b) Lower landing key switches (newel end).

16.3. With the control selector switch in 'test' position, it shall be possible to start the escalator in either direction from pushbuttons on the front door of the main control cabinet only.

16.4. In order to protect against the possibility of inadvertent re-starting of the escalator, due to a jammed start key switch defect, the input signal to the control system from the start key switches in the newels shall be 'edge-triggered' (i.e., they shall only initiate a start sequence when they change their condition).

Moreover, if a start key switch has been jammed for more than 10 seconds, the controller screen shall display a warning message. It shall not be possible to run the escalator until the defect is resolved and controller reset pushbutton is pressed.

17. Inching

17.1. General requirements

17.1.1. The *Contractor* shall demonstrate that the portable handheld inching control device is either safely compatible with, or not physically interchangeable with, other LUL escalator inching devices (see clause 17.1.2 below).

17.1.2. The LUL standard portable handheld inching control device, described in clause 17.1.1, connects, via a plug, to a 10 pin socket with plug/socket pin number allocation as described in table 3.2 below.

Pin number	Device
1	Stop pushbutton connection
2	Stop pushbutton connection
3	Link to pin 4
4	Link to pin 3
5	Ready indicator connection
6	Ready indicator connection
7	Feed to ‘Inch’ (common/run) pushbutton
8	‘Up’ signal from ‘Up’ pushbutton
9	‘Down’ signal from ‘Down’ pushbutton

Table 3.2: Inching device pin number allocation summary

17.1.3. The inching control device shall include an ‘inch’ (common/run) pushbutton.

17.1.4. The labelling text shall be agreed by the *Employer* at the design stage.

17.1.5. The inching control device shall be permanently marked to identify the station and escalator number.

17.1.6. A storage facility shall be provided to house the handheld inching control device. If this facility is within the controller cabinet, it shall be in a separate compartment, accessible without gaining access to the controller interior.

17.1.7. The approximate locations for required inching sockets are given below. The precise location of the inching sockets shall be agreed with the *Employer*, at the design stage:

a) Controller cabinet door;

b) Within the truss at the upper landing return station;

c) Within the truss at the lower landing return station;

d) Upper newel (behind lockable enclosure);

e) Lower newel (behind lockable enclosure);

f) - h) Refer to annexe.

17.1.8. Refer to annexe.

17.1.9. Refer to annexe.

17.2. Inching operation

17.2.1. With the control selector switch in the 'inch' position, it shall be possible to run the escalator at inching speed by the use of a handheld inching control device. It shall not be possible to start the escalator at normal speed when 'inch' mode is selected.

17.2.2. The escalator shall only operate in 'inch' mode, when the 'inch' pushbutton as well as either the 'up' or the 'down' pushbutton, (on the handheld inching control device), are pressed. If the 'up' and 'down' pushbuttons are pressed simultaneously, the escalator shall remain inoperative, i.e. they shall be electrically interlocked. Upon release of any of the pushbuttons the brakes shall apply.

17.2.3. The start sequence shall only commence following activation of the 'inch' pushbutton and either the 'up' or 'down' pushbutton. i.e. Upon reset of a safety device, the control system shall not have already commenced the start sequence.

17.2.4. Removal of a dummy plug shall interrupt the safety line to stop or prevent starting the escalator and display an appropriate message on the controller screen.

17.2.5. Removal of another dummy plug, or further unit plugged in, shall display an appropriate message on the controller screen. e.g. 'Check inch pendants'.

17.2.6. With a handheld pendant plugged in, it shall not be possible to start the escalator in 'normal' or 'test' mode.

17.2.7. Selection of 'normal' or 'test', with an inching device plugged in shall inhibit a start command and display an appropriate message on the controller screen. e.g. 'Check inch pendants'.

18. Controller screen

18.1. A real-time visual display screen shall be provided on the front of the controller. It shall be LCD type, with a touch sensitive screen or integrated keypad for interrogation purposes.

18.2. Status and fault messages shall be displayed on the controller screen. For guidance, these shall include, but not be limited to the messages listed in Appendices 3.1 and 3.2.

18.2.1. The message display shall consist of at least two lines, with at least 20 characters per line.

18.2.2. If more than one fault exists, they shall be shown on the controller screen in succession at intervals or on a dedicated screen.

18.2.3. When a message does not fit on one line, the message shall be displayed on two lines, or alternatively scrolled horizontally.

18.3. All escalator electrical system faults shall be date and time stamped and recorded within the control system memory, and sent to an historical alarm data log on the controller screen display.

18.3.1. The controller screen shall store the following information for later interrogation:

a) At least the last 200 faults;

b) At least the last six stopping distances;

c) Stand-by operation 'on'/'off' and direction of running.

18.4. Kinked link fault data shall be recorded as a single fault, clarified by the number of operations during the current run operation recorded as statistical information.

18.4.1. A flashing warning message "kinked link – check step chains", or similar, shall be displayed in the event of six consecutive kinked link faults being recorded.

18.5. The controller screen shall display the following information, without the use of a password:

a) All normal and fault status conditions;

b) Speed and direction of travel of the stepband and handrails, with units of measurement clearly displayed;

c) Statistical information;

d) Historical status and alarm data log.

18.6. Security key 'engineer' level password access facilities shall be provided for the following password protected adjustments:

a) Real time clock;

b) Lubrication settings (to allow continuous 'on'/'off' timing control, adjustable within pre-set limits);

c) Adjustable parameter settings;

d) Screensaver facility delay, if needed to extend the life of the controller screen.

18.7. The procedure for user interface with the controller screen shall be documented within the safe use and operation handbook, described in Part 1, clause 12.7.1 of this specification.

19. Volt free contacts for escalator status monitoring

19.1. Volt-free contacts shall be used to provide indications to a remote escalator status indication panel located in the station operations room, as described in section 27.

19.2. The volt-free terminals shall be wired to a clearly labelled termination point within the UMC/Electrical Equipment Room, in a location to be agreed with the *Employer*. This termination point is required for the connection of the remote status indication panel by the *Contractor*, and also the future connection of an alternative remote monitoring system by others.

19.3. The passenger emergency stopped signals from the appropriate stop switch operated shall be made available to activate a CCTV camera monitor. For simplicity, a maximum of three signals shall be provided: upper, lower and incline.

20. Main controller front panel door layout

20.1. A generic layout shall be provided for the control devices and labelling, fitted on the main control cabinet front door. Appendix 3.3 is provided for guidance.

21. Control pushbuttons

21.1. All pushbuttons shall be shrouded with the exception of the emergency stop pushbutton which shall be the positive displacement type and shall lock 'off' once operated, with a twist action to release.

22. Device status monitoring and reset

22.1. A 'controller reset' facility shall be incorporated to prevent restarting of the escalator following the operation of a safety device (and subsequent local reset, if applicable), operation of a protective device, protective circuit or main power or driving/braking contactor welded. The 'reset' pushbutton shall be provided on the front door of the main control panel. See Appendices 3.1 and 3.2 for requirements.

22.1.1. The exceptions to clause 22.1 whereby safety devices do not require a 'controller reset', following being reset locally, are as follows:

a) Passenger emergency stop switches: mechanically reset by key in lid;

b) Emergency stop switch isolator, described in clause 7.5.2: manual operation;

c) Emergency stop pushbuttons on truss: latching button - twist to reset;

d) Dummy plugs for handheld inching device sockets: replace dummy plug;

e) Emergency stop on handheld inching device: latching button - twist to reset.

22.2. The status of all driving and braking function related contactors shall be monitored. If a monitored contactor has not switched on when required, the controller screen shall display a fault message and prevent any further running until the fault has been rectified. Moreover, if a monitored contactor has not switched off (for example, because contacts have welded), then the controller screen shall also display a fault message and prevent any further running until the fault has been rectified.

22.3. The status of the braking system shall be monitored. Once the control system activates a brake, it shall check that the brake has actually lifted by monitoring the relevant contact. If a brake has not lifted, the controller screen shall display a fault message, and prevent further running until the fault has been rectified. The output from these status switches shall be used to reduce the current to the brake once it has lifted.

22.4. If any safety device is activated, such as the carriage switch, the brakes shall be applied. Once the safety device is reset, the control system shall confirm that the operational and auxiliary brakes are applied before the escalator can be re-started. The *Contractor* shall demonstrate that the arrangement used for confirming that the brakes are applied is fail safe and will not lead to a dangerous situation in the case of a fault (e.g. the loss of the connection of a pair of contacts shall not lead to a dangerous situation).

Note: The use of redundancy and cross checking in the arrangement used for confirming the status of the brakes is considered an effective method of meeting such a requirement.

23. Kinked link indication

23.1. The step chain shall be monitored to detect chain 'kinking', caused by inadequate/ineffective lubrication.

23.2. The control system shall record a single fault message to register a kinked link condition.

23.3. A fault message shall be displayed on the controller screen as described in clause 18.4.

24. Lubrication

24.1. The lubricator, (see Part 2, section 11 of this specification) shall be powered by a motor of maximum voltage rating, 230V.

24.2. The lubricator shall be prevented from running while the escalator is stationary.

24.3. Loss of the lubricator power supply while the escalator is running shall display a fault message on the controller screen and shall not cause the escalator to stop. It shall not be possible to restart the escalator until the lubricator power supply is restored.

24.4. Timer settings shall be adjustable within pre-set limits to satisfy the lubrication requirements of the escalator. The rationale for the design of the lubrication system, in particular the settings, shall be justified by the *Contractor* at the design stage.

25. Electrical equipment cabinets

25.1. General

25.1.1. Electrical equipment cabinets shall be metallic. (see sub-section 25.2, below).

25.1.2. All electrical equipment cabinets shall be sized to suit actual requirements (i.e. not oversized).

Note: Site-specific spatial constraints may dictate that a generic design is inappropriate.

25.1.3. Cabinet sides and base shall be rigid (not prone to flexing).

25.1.4. Door(s) shall be rigid and shall not be easily removable from their hinges.

25.1.5. Door(s) shall be locked by use of tool-operated, 8mm triangular lock or locks (EMKA type or equivalent). A key locking system is not acceptable.

25.1.6. The location of electrical equipment cabinets shall allow easy access, shall not cause any obstruction to other equipment and shall be maintainable.

25.1.7. The air temperature rise inside cabinets, when operating, shall not exceed the ambient by more than the limits stated in BS EN 61439-1.

25.1.8. Electrical equipment cabinet(s) shall be designed to minimise the detrimental effects of high heat output components on reliability and component service life.

Note: Design and maintenance requirements for electrical equipment cabinet(s) construction, component layout and ventilation are key to maximising reliability and service life.

25.2. Drive and main control system cabinets

25.2.1. The drive and main control system shall be housed in free standing cabinet(s) and mounted on an integral plinth of minimum 100mm from the floor to avoid the effects of flooding. The plinth shall prevent the accumulation of dirt and dust under the cabinet and shall incorporate a means of securing the controller and plinth assembly to the floor.

25.2.2. Cabinet(s) shall be fabricated from a minimum of 2mm mild steel sheet, or stainless steel.

25.2.3. Refer to annexe.

25.2.4. Access to equipment within cabinets shall be via front mounted, (not self-closing) side hinged doors.

25.2.5. Provision shall be made to permit cable entry from above.

25.2.6. A storage facility shall be provided inside the main control cabinet, for wiring diagrams folded to A4 size.

25.2.7. The surface coating shall be applied in accordance with the manufacturers' instructions to give complete and even coverage with no flakes, cracks or damage.

26. Drive motors

26.1. Operational requirements

26.1.1. Each motor shall conform to quality Grade B (Special) for vibration as defined in BS EN 60034-14.

26.1.2. The noise level generated by each motor under no load shall not exceed 73 db (A) MSPL. Irrespective of this requirement, the cumulative noise level generated by the escalator equipment shall not exceed the level stated in Part 1, clauses 10.15.1 and 10.15.2 of this specification.

26.1.3. The duty cycle of the motor is defined in Part 1, sub-section 10.6 of this specification. See Part 4, section 8 for testing requirements.

26.1.4. All motors shall be identically rated and selected for their compatibility and similar performance requirements.

26.2. Design requirements - general

26.2.1. Totally Enclosed Fan Cooled (TEFC) squirrel cage induction motors shall be provided.

26.2.2. Motors shall be designed for reversible operation.

26.2.3. Motors shall meet the requirements of BS EN 60034-1, BS EN 60034-8, BS EN 60034-9, BS EN 60034-14, and BS 4999-141.

Note: Conformance with IEC72 is sufficient to prove conformance with BS 4999-141.

26.2.4. The *Contractor* shall provide torque/speed and current/speed curves for the motor, as part of the design submission.

26.2.5. The *Contractor* shall design and install to prevent earth leakage through the bearings.

26.3. Rotor shaft

26.3.1. The rotor shaft shall be a parallel type with a keyway on the output end to close fit limits, and shall conform to BS 4999-141, and BS 4235-1.

26.3.2. Where drive couplings are used, the rotor shaft shall be capable of accepting a precision fit coupling.

26.4. Electrical design

26.4.1. A thermistor shall be provided in each motor winding, to protect against overload.

26.4.2. The stator windings and the rotor shall be resistant to condensation.

26.5. Winding design

26.5.1. The *Contractor* shall demonstrate that the full load torque is sufficient to allow recovery of the full load on the escalator to the upper landing, for weight testing purposes. The *Contractor* shall state the actual multiple of full load torque required to allow recovery of the full load.

26.5.2. The motor shall be S1 rated, in accordance with BS EN 60034-1, at a duty rating of 120kg per exposed step.

26.6. Terminal box

26.6.1. Terminal markings and rating plates shall be in accordance with BS EN 60034-8.

26.7. Insulation

26.7.1. All internal conductors shall be insulated throughout their length.

26.7.2. Cable lugs shall be insulated.

26.7.3. Motor thermal class (insulation class) shall be Class 'F', as defined in BS EN 60085.

27. Remote escalator status indication (Station Operations Room)

27.1. General requirements

27.1.1. Escalator status indications shall be provided in the Station Operations Room, in compliance with the Railway Safety Principles and Guidance – Part 2, section B - clause 50. Refer to site-specific documentation for station specific requirements.

27.1.2. Refer to annexe.

27.1.3. The escalator status indications shall provide station staff with the following information during normal passenger service:

a) Escalator stopped or out of service;

b) Direction of travel;

c) Notification that a passenger emergency stop switch has been operated.

27.2. Construction

27.2.1. Refer to annexe.

27.2.2. A set of four indications shall be provided for each escalator, together with a single indication to show that the power supply to the panel is 'on'. Each indication shall be labelled according to its meaning. Indication labels and colours shall be as shown in table 3.3 below:

Indication	**Colour**
POWER ON	Green
STOPPED	Red
UP	Green
DOWN	Green
PASSENGER EMERGENCY STOP OPERATED	Red

Table 3.3: Escalator status indications

27.2.3. There shall be two push/touch buttons on the assembly. These shall be labelled 'ACKNOWLEDGE' and 'INDICATOR TEST'.

27.2.4. The status indication panel shall make provision to enable monitoring of all escalators on a station, or as described in the site-specific specification.

27.3. Functional requirements

27.3.1. If an escalator stops during normal passenger service, then its corresponding 'stopped' indication shall illuminate and an audible alarm shall sound. This state shall continue until either the escalator is re-started or the 'acknowledge' push/touch button is pressed.

27.3.2. The tone and volume of the audible alarm shall be adjustable from within the unit. The volume range shall be nominally from 75dB(A) to 85dB(A), as measured at 1 metre from the unit, with the unit installed within the SOR.

27.3.3. When the 'acknowledge' push/touch button is pressed, the audible alarm shall switch off and the 'stopped' indication shall remain constantly illuminated. On re-start of the escalator, the indication shall also switch off.

27.3.4. If a passenger emergency stop is operated, the 'passenger emergency stop' indication shall illuminate. This state shall continue until either the passenger emergency stop is locally reset, or the 'acknowledge' push/touch button is pressed.

27.3.5. If the 'indication test' push/touch button is pressed, all the indications shall illuminate, and the audible alarm shall sound, for as long as the button is held. This function shall not affect the normal operation of the panel or escalator.

27.4. Wiring

27.4.1. Refer to annexe.

27.4.2. Refer to annexe.

27.4.3. Refer to annexe.

27.4.4. Refer to annexe.

28. Electrical components – General

28.1. Isolators

28.1.1. Isolators shall be rated for on-load switching.

28.1.2. The handle of the isolator shall provide a mechanical, visual 'on' and 'off' indication.

28.1.3. If isolator auxiliary contacts are provided, they shall be interlocked such that disconnection of the main contacts cannot be carried out without first disconnecting the auxiliary contacts.

28.2. Circuit protection

28.2.1. All circuits shall be adequately protected. Whenever possible, miniature circuit breakers shall be used in place of fuses.

28.2.2. Due consideration shall be given to prevent nuisance tripping from magnetic inrush of currents during transformer or coil excitation.

28.3. Fuses

28.3.1. The main supply shall be protected by fuses to BS HD 60269-2.

28.3.2. Fuse labels shall state the rating and cartridge designation, corresponding to the schematic wiring diagrams.

28.4. Over current, over voltage and under voltage protection

28.4.1. Over current, over voltage and under voltage protection device settings shall be agreed with the *Employer* at the design stage.

Note: For under voltage tolerance requirement, see clause 2.2 above. For residual current protection requirement, see clause 8.1 above.

28.5. Contactors

28.5.1. Contactors shall be capable of operating at a rate equivalent to 180 starts per hour, and shall be fail-safe in their operation, i.e. the main contacts shall be open when de-energised.

28.5.2. Arc shields and magnetic blow-out coils shall be provided where necessary.

28.6. Relays

28.6.1. On solid state devices, suitable surge protection against voltage transients shall be provided.

28.6.2. All relays shall be fail-safe in their operation, and where required they shall have additional contacts for monitoring purposes.

28.7. Cables

28.7.1. Cables shall be LSZH and shall be compliant with the fire performance requirements described in Part 4, section 10 of this specification.

28.7.2. All wiring and cable runs shall be suitably supported and protected.

28.7.3. Cabling within the enclosures shall be neatly loomed and secured by cable ties, spiral wrapping or internal trunking as appropriate. Any supporting material shall be of a flame retardant, non toxic type.

28.7.4. Cables or looms of wires connected to an enclosure door shall be fitted with a spiral harness or similar, to protect them from any damage.

28.8. Cable terminations

28.8.1. All wiring shall be brought to terminal blocks for interconnection to other equipment. Wiring shall be terminated with solderless crimped connectors, except where cage clamp terminals are used.

28.8.2. All terminals shall be labelled and shall be laid out for ease of access.

28.8.3. Terminals which remain live after the incoming power supply is isolated shall be shrouded and suitably labelled to indicate this.

28.8.4. A minimum of 5% additional terminals for control circuits shall be provided as spares, and also sufficient earth terminals to accommodate any unused cores of multicore cables.

28.9. Safety notices and identification labelling

28.9.1. The control system equipment shall be fitted with clearly worded safety notices in accordance with BS ISO 7010.

28.9.2. Every item of equipment shall be fitted with an identification label, in accordance with the relevant label drawing or list..

28.9.3. Notices and identification labels shall be made from either aluminium or plastic laminate e.g. 'Traffolyte' or equivalent and engraved.

28.9.4. The manufacturer's nameplate shall be fixed on the outside of each control system cabinet, detailing the information as defined in BS EN 60947-1 and BS EN 61439-1 and other additional relevant items, including the following:

a) Manufacturer's name or logo;

b) Type designation;

c) A serial number, traceable to the purchase or contract order number;

d) Date of manufacture;

e) Total assembly weight in kg.

28.9.5. The following electrical equipment notices/labels are detailed for standardisation purposes:

a) "ISOLATOR", 7mm high, with "No_", in 40mm high text below. Labels shall be positioned on the front of the main power isolator. Text font shall be Arial, black;

b) "DRIVE", 7mm high, with "No_", in 40mm high text below. Labels shall be positioned on the front of the drive cabinet. Text font shall be Arial, black;

c) "CONTROLLER", 7mm high, with "No_", in 40mm high text below. Labels shall be positioned on the front of the controller. Text font shall be Arial, black;

d) Refer to annexe;

e) "Danger high voltage", text font shall be Arial 10mm high;

f) "Isolate by removal of 'Castell' key before opening the door", text font shall be Arial 8mm high;

Note: labels d) and f) may be combined into one label.

g) A warning label, reading "Danger" and describing the various 'live' supplies in each electrical equipment cabinet. Text font shall be Arial 6mm high for "Danger" and 4.5mm high for the 'live' supplies;

h) Identification labels for all pushbuttons, switches, components, indicators, terminals and control panels. Text font shall be Arial 4mm high, black.

Note: N^{o}_ denotes the escalator number as detailed in the site-specific specification.

28.9.6. All labels shall be durably fixed with screws or rivets, as appropriate and shall not reduce the enclosure protection rating of any equipment. No labels shall be affixed with adhesives unless specifically instructed by the *Employer*. Self-adhesive labels shall not be used.

28.9.7. All cables shall be fitted with individual identification labels at both ends. Each label shall state escalator number and route designation. For example an escalator number 1, cable designated N shall read '1-N'.

28.9.8. Within all electrical equipment cabinets, the cores of all cables and terminals shall be identified by markings, which shall correspond to the schematic wiring diagram.

28.9.9. Every item of operational equipment shall be clearly labelled at all times, including during installation.

29. Field wiring

29.1. General requirements

29.1.1. The whole of the installation shall be undertaken in accordance with BS 7671 and good EMC practices. It shall be certificated in accordance with BS 7671.

29.1.2. All cables used shall be LSZH, in trunking or on perforated cable trays or in conduit.

29.1.3. Cables installed on cable tray shall be armoured or braided to provide adequate mechanical protection, as appropriate.

29.2. EMC compliance

29.2.1. The field wiring forms part of the escalator control system, therefore, the type of field wiring installed shall comply with the requirements of the *Contractor's* EMC certification for the control system.

29.3. Cable containment

29.3.1. Surface coatings shall be in accordance with Part 1, sub-section 10.13 of this specification.

29.3.2. Where cable tray/trunking attach directly to structural surfaces, stand-off brackets shall be used to give a minimum clearance of 40mm.

29.3.3. All cable tray/trunking shall be designed to have 20% minimum spare capacity for future cables.

29.3.4. Fixings shall support the full width of cable tray/trunking.

29.3.5. Trunking shall be in accordance with BS EN 50085. Cable trays shall be perforated formed from plain steel sheet in accordance with BS 1449-1.1.

29.3.6. Minimum thicknesses of cable trays shall be 1.0mm, for up to 150mm wide, 1.2mm for up to 450mm wide and 1.5mm for tray in excess of 450mm wide.

29.3.7. Cable tray shall only be cut along a line of plain metal, i.e. not through the perforations. All cut edges shall be filed smooth, prepared and treated with a zinc rich paint.

29.3.8. Where it is necessary to cut holes in the tray for the passage of cables, these holes shall be bushed.

29.3.9. Adjacent sections of cable tray shall not have gaps larger than 5mm between them.

29.3.10. Flexible conduit lengths shall not exceed 1m.

29.4. Wiring and cabling

29.4.1. Certificates of Conformity are required to demonstrate compliance with the fire performance requirements of Part 4, section 10 of this specification. If a distributor supplies the cable, the distributor

shall obtain the relevant authorisation signature confirming compliance from the manufacturer of the cable, and include this as part of the C of C.

29.4.2. Galvanised straps or stainless steel ties shall be used for retaining cables. Plastic cable ties shall not be used.

29.4.3. All unused cores within multicore cables shall be connected to earth at each end and labelled to identify as 'spare'.

29.4.4. Plug and socket connections are permitted but it must not be possible to cross connect adjacent devices or adjacent escalators. When adjacent escalators have newel box control panels side by side - plugs must not be inter-changeable.

29.4.5. No tee or other joint shall be permitted without the permission of the *Employer*, in writing.

30. 110V power socket on the passenger side

30.1. The *Contractor* shall install a 110Va.c. socket within the top and bottom pit area of the escalator.

30.2. The type of socket outlet shall be to BS EN 60309 socket outlet - rated at 16 amps.

30.3. The *Contractor* shall connect each 110V socket outlet into an existing socket outlet ring final circuit, which shall be isolated before any work commences.

30.4. The existing circuit shall be verified by inspection, testing and certification before work commences in accordance with BS 7671.

30.5. The modified circuit shall be verified by inspection, testing and certification upon completion, in accordance with BS 7671.

31. Lighting

31.1. Refer to annexe.

31.2. Refer to annexe.

Document history

Revision	Date	Notes
01	October 2010	First issue.
02	April 2011	For document change detail see separate document.
03	May 2011	Approved for use in Pan-TfL escalator PQQ. For document change detail see separate document.
04	August 2011	For document change detail see separate document.
05	-	Rev. 05 of Part 3 does not exist (rev. suffix of parts aligned @ rev.06).
06D	February 2012	DRAFT for use – Pan-TfL. For document change detail see separate document.
06	April 2012	APPROVED for use – Pan-TfL. Changes since DRAFT rev.06 = clauses 9.8, 9.8.1 and 9.8.2 added. No other changes.
07	July 2012	APPROVED for use – Pan-TfL. No changes.

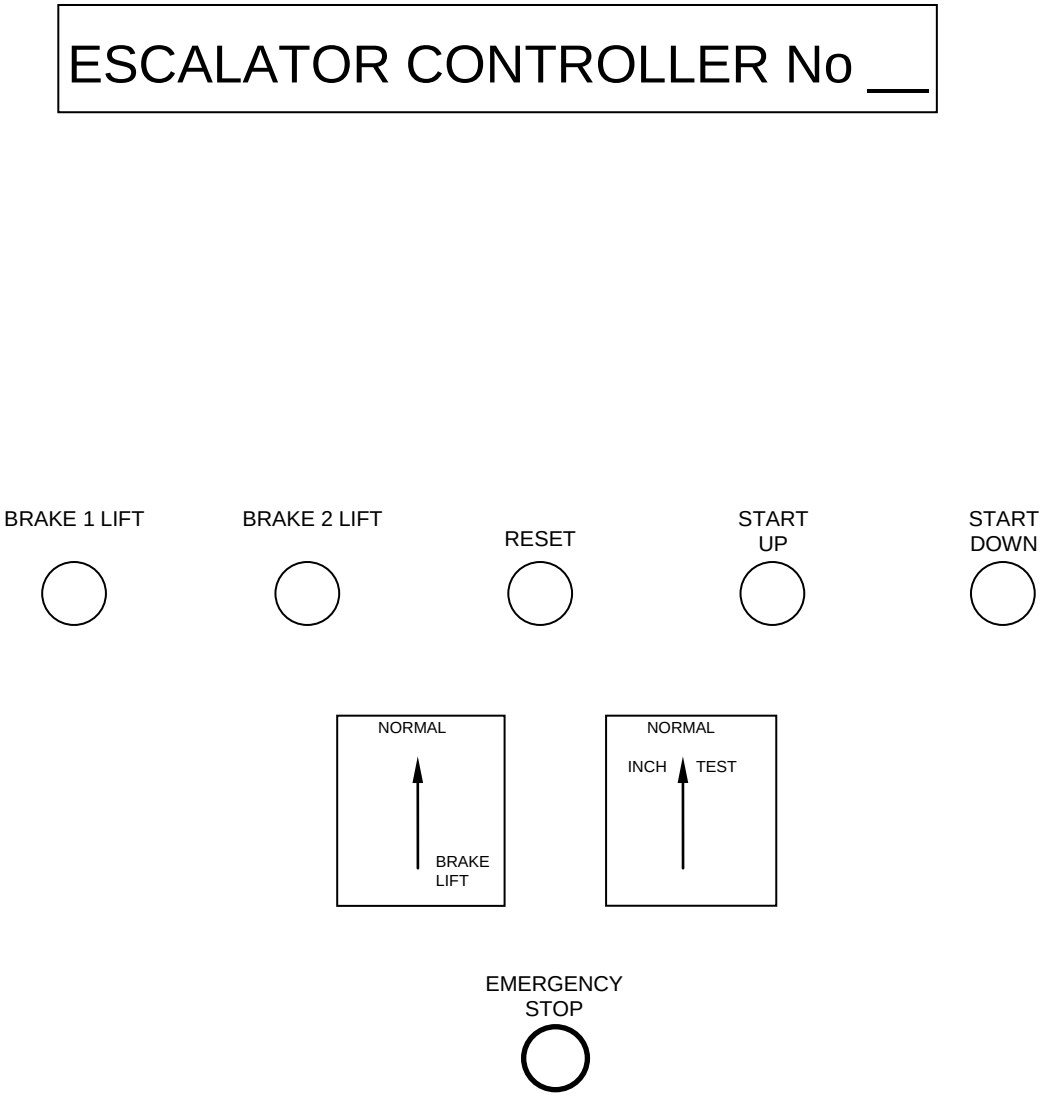
Appendix 3.1 - Safety and stop devices – controller screen fault messages & system response

Safety device	Fault message (typical)	Stop drive	Controller reset
Brake lift selector switch	Brake lift selected	Yes	No
Carriage switch (left)	Carriage tension switch - left	Yes	Yes
Carriage switch (right)	Carriage tension switch - right	Yes	Yes
Comb switch (upper – left)	Comb switch operated - upper - left	Yes	Yes
Comb switch (upper – right)	Comb switch operated - upper - right	Yes	Yes
Comb switch (lower – left)	Comb switch operated - lower - left	Yes	Yes
Comb switch(lower – right)	Comb switch operated - lower - right	Yes	Yes
Emergency stop switch isolator in LMC	Isolator in lower chamber	Yes	No
Emergency stop pushbutton on controller	Controller emergency stop push	Yes	Yes
Emergency stop pushbutton on truss	Inch station plug / Truss stops	Yes	No
Floor plate switch (upper)	Floor plate switch - upper	Yes	Yes
Floor plate switch (lower)	Floor plate switch - lower	Yes	Yes
Handrail entry switch (upper – left)	Handrail entry switch - upper - left	Yes	Yes
Handrail entry switch (upper – right)	Handrail entry switch - upper - right	Yes	Yes
Handrail entry switch (lower – left)	Handrail entry switch - lower - left	Yes	Yes
Handrail entry switch (lower – right)	Handrail entry switch - lower - right	Yes	Yes
Handrail speed monitors	Left handrail underspeed	Yes	Yes
	Right handrail underspeed	Yes	Yes
Inch dummy plugs	Inch station plug / Truss stops	Yes	No
Motor end shaft cover interlock (if applicable)	Handwinding interlock	Yes	Yes
Missing step device – upper	Missing step detected - upper	Yes	Yes
Missing step device – lower	Missing step detected - lower	Yes	Yes
Passenger emergency stop upper	Passenger emergency stop upper	Yes	No
Passenger emergency stop intermediate/s	Passenger emergency stop intermediate_	Yes	No
Passenger emergency stop lower	Passenger emergency stop lower	Yes	No
RCD fault	RCD fault	Yes	Yes
Sagged step - upper	Sagged step detected - upper	Yes	Yes
Sagged step - lower	Sagged step detected - lower	Yes	Yes
Step band interlock (left) - incline	Step band anchor - left	Yes	Yes
Step band interlock (right) - incline	Step band anchor - right	Yes	Yes
Step speed monitor	Escalator underspeed	Yes	Yes
	Escalator overspeed	Yes	Yes

Appendix 3.2 - Protective and monitoring devices – controller screen fault messages & system response

Protective device	Fault message (typical)	Stop drive	Controller reset
Kinked link switches	Kinked link detected	No	No
Motor thermistors	Motor thermistors	Yes	Yes
Gearbox oil level switch	Gearbox oil level low	No	Yes
Control system	Brake contactor welded	n/a	Yes
	Auxiliary brake lift failed	Yes	Yes
	Auxiliary brake failed running	Yes	Yes
	Check No.of inch units fitted	n/a	No
	Drive not ready	Yes	Yes
	Drive unit fault	Yes	Yes
	Lubricator overload	No	No
	Lubricator supply failed	No	Yes
	Main contactor fault	Yes	Yes
	Operational brake lift failed	Yes	Yes
	Operational brake failed running	Yes	Yes
	Overload fault	Yes	Yes
	Phase failure	Yes	Yes
	PLC module/processor fault	Yes	Yes
	Ready to inch	n/a	n/a
	Regenerate unit fault	Yes	Yes
	Start keyswitch jammed	Yes	Yes
	Start sequence failed	Yes	Yes
	Stopping distance too long	n/a	Yes

Appendix 3.3 - Main control cabinet front door basic layout - provided for guidance



Annexe – for LUL

LUL 2. Escalator power supply

LUL 2.3. The escalator electrical system shall be designed to be compatible with a supply as described in BS EN 61000-2-4, class 3.

LUL 2.4. Following award of contract the *Employer* will perform tests to determine the level of Total Harmonic Distortion (THD) present in the mains power supply and provide the *Contractor* with a copy of the test results, carried out over a period of 4 days, including the complete weekend.

Note: Clause LUL 2.3 applies, irrespective of the results of these tests.

LUL 2.5. Within 4 weeks of the escalator load being applied the *Contractor* shall provide a report of a site test of harmonic characteristics, carried out over a period of 4 days, including the complete weekend, and power factor as described in section 3.5.3. of LUL Standard 1-100.

LUL 2.6. The power supply cable will be run, by others, to the vicinity of the incoming supply isolator (described in section 9). The *Contractor* shall liaise with the *Project Manager* prior to connecting the escalator electrical system to this power supply.

LUL 6. Earth bonding

LUL 6.3. The *Employer* will provide a copper or aluminium earth bar adjacent to the incoming (earthed) supplies, of suitable size to accommodate all earthing requirements.

LUL 6.4. LUL drawing number 42-71-002 is a representative diagram of the minimum requirements for equipotential bonding - this drawing is provided for guidance only.

LUL 6.5. The *Contractor* shall securely bond all extraneous conductive parts within the equi-potential zone, which are within the scope of works, to the earth terminal as required by BS 7671. The *Contractor* shall inspect and report any pre-existing non-compliances of earthing and equipotential bonding, within the defined equipotential zone to the *Project Manager*, so that corrective works can be arranged.

LUL 7. Safety and stop devices

LUL 7.4. Passenger emergency stop switches

LUL 7.4.1. Passenger emergency stop switches (known as 'half-diamonds') shall be provided to LUL drawing number 584-949.

LUL 7.4.6. Where a fixed staircase is located adjacent to an escalator, additional 'half-diamonds', aligned with those on the escalator, shall be installed, with their push panels facing the staircase. All push panels shall be arranged to stop the escalator. Where the decking between an escalator and a fixed staircase is greater than 1400mm measured between the escalator handrail and the edge of the staircase, no additional 'half-diamonds' shall be fitted.

LUL 7.5. Manually operated stop devices

LUL 7.5.1.

b) At each truss inch socket location, as described in clause LUL 17.1.7 below;

c) At the top of the incline, on the unguarded side of each access incline gate;

d) In the case of central escalators in flights of 3 or more, on the opposite side of the truss to the inch sockets, at approximately 10m spacing.

Note: see maintenance access requirements described in Part 1, sub-section 10.10 of this specification.

LUL 7.5.2. An emergency stop switch isolator shall be provided in the LMC to facilitate a safe isolation procedure for emptying dust trays.

LUL 10. Drive and control system

LUL 10.4. Inverter drive system

LUL 10.4.6. The VVVF drive shall be of the active front end type, in order to limit the harmonics drawn from the supply.

LUL 10.4.7. The VVVF drive system shall include an automatic regenerative unit, unless specified otherwise in the site-specific documentation.

LUL 11. Power supply harmonics

LUL 11.1. Emissions

LUL 11.1.1. The escalator electrical system shall comply with BS EN 61000-3-4, table 1.

Note: The supply R_{sce} is assumed to be 33. The load application in accordance with LUL Standard 1-100 will be based on the harmonic current limits in BS EN 61000-3-4, table 1.

LUL 11.1.2. If the escalator electrical system is not compliant to BS EN 61000-3-4, table 1, the *Contractor* shall provide details of the harmonic injection currents (Amps) for up to the 50th Harmonic. The *Employer* will submit a revised load application, which may or may not be successful.

LUL 11.2. Immunity

LUL 11.2.1. The electrical system shall be designed for immunity to harmonics in accordance with the highest levels present on a supply as defined in BS EN 61000-2-4, class 3. Where the test report as described in clause LUL 2.4. shows harmonics in excess of these levels, the escalator shall also be compatible with these levels.

Note: Both LUL and DNO supplies are nominally 400Va.c. 3 phase 50Hz but the LUL supply has inherently higher harmonic levels. BS EN 61000-4-13 provides further details of the levels of harmonics that are likely to be present in an industrial environment together with suitable test methods to demonstrate equipment immunity compliance. The 11th and 13th harmonics, which are derived from the LUL DC traction system, are higher than generally encountered.

LUL 17. Inching

LUL 17.1. General requirements

LUL 17.1.7.

f) Within the machine room at the transition between the incline and upper landing, on one, common side;

g) Within the machine room at the transition between the incline and lower landing, on one, common side;

h) On the incline, on one, common side – at approximately 10 metre spacing on the truss.

LUL 17.1.8. Inching socket assemblies mounted on the truss shall each be fitted with a latching emergency stop pushbutton (twist to release).

LUL 17.1.9. The assemblies described in clause LUL 17.1.8 above shall be fitted such that they do not protrude beyond the envelope of the escalator truss, to prevent accidental stoppage.

Note: see maintenance access requirements described in Part 1, sub-section 10.10 of this specification.

LUL 25. Electrical equipment cabinets

LUL 25.2. Drive and main control system cabinets

LUL 25.2.3 Cabinet height shall not be greater than 1800mm from finished floor level and overall dimensions minimised, without restricting access to internal components, (1200mm wide x 800mm deep are preferred maxima). The control system design shall consist of no more than two cabinets within this size range.

LUL 27. Remote escalator status indication (Station Operations Room)

LUL 27.1. General requirements

LUL 27.1.2. The location of the escalator status indication assembly within the SOR, and the method of fixing, shall be agreed between the *Contractor* and the *Employer*.

LUL 27.2. Construction

LUL 27.2.1. The assembly enclosure shall be of unpainted stainless steel construction, and shall be of a compact design.

LUL 27.4. Wiring

LUL 27.4.1. The supply to the assembly will be 230Va.c. 50Hz rated at 13A and will be provided by others. The *Contractor* shall take the electrical supply from a local isolator or terminal block fed from a local fuse board, as instructed by the *Employer*.

LUL 27.4.2. Internal circuits within the assembly, and between the SOR and the controller, shall use low voltage a.c., derived from a transformer within the assembly.

LUL 27.4.3. Unless specified otherwise, in the site-specific documentation, the interface cabling between each escalator controller and the Station Operations Room will be installed by the *Employer*. The *Contractor* shall provide a technical specification for the interface cable.

LUL 27.4.4. Unless specified otherwise, in the site-specific documentation, the *Contractor* shall be responsible for connection to the power supply point and testing.

LUL 28. Electrical components – General

LUL 28.9. Safety notices and identification labelling

LUL 28.9.5. d) “Immobilisation or isolation” to LUL drawing number 384-945 on the main power supply isolator.

LUL 31. Lighting

LUL 31.1. The BS 8300 requirement of a 100lux lighting level is satisfied by lighting levels in the station.

LUL 31.2. Not applicable for LUL.

Annexe – for CRL

CRL 2. Escalator power supply

CRL 2.3. Not applicable for CRL.

CRL 2.4. Not applicable for CRL.

CRL 2.5. Not applicable for CRL.

CRL 2.6. Dual power supplies shall be provided for all escalators. The changeover switch shall be situated local to the power supply.

CRL 6. Earth bonding

CRL 6.3. All individual a.c. powered equipment shall meet the applicable requirements of the following:

a) BS EN 61000-3-2;

b) BS EN 61000-3-12.

CRL 6.4. The *Contractor* shall ensure that the level of Total Harmonic Distortion (THD) present in the mains power supply is within the acceptable requirements identified from G5/4-1.

CRL 6.5. All extraneous conductive parts within the equi-potential zone, which are within the scope of this specification, shall be securely bonded to the earth terminal as required by BS 7671.

CRL 7. Safety and stop devices

CRL 7.4. Passenger emergency stop switches

CRL 7.4.1. Passenger emergency stop switches shall be provided to CRL drawing number ID0205-G0G00-M00-P-50018.

CRL 7.4.6. Staircases do not apply to Crossrail.

CRL 7.5. Manually operated stop devices

CRL 7.5.1. Not applicable for CRL.

CRL 7.5.2. Not applicable for CRL.

CRL 10. Drive and control system

CRL 10.4. Inverter drive system

CRL 10.4.6. The VVVF drive shall contain an active filter in order to limit the harmonics drawn from the supply.

CRL 10.4.7. The VVVF drive system shall make use of an automatic regeneration system where it is appropriate and following agreement with the *Employer*.

CRL 11. Power supply harmonics

CRL 11.1. Emissions

CRL 11.1.1. The electrical installation and associated equipment shall comply with the CRL EMC management plan.

CRL 11.1.2. All individual a.c. powered equipment shall meet the applicable requirements of the following:

a) BS EN 61000-3-2;

b) BS EN 61000-3-12;

c) G5/4-1.

CRL 11.2. Immunity

CRL 11.2.1. The electrical system must take into account planning levels for 400V systems, specified in G5/4-1.

CRL 17. Inching

CRL 17.1. General requirements

CRL 17.1.7. Not applicable for CRL.

CRL 17.1.8. Not applicable for CRL.

CRL 17.1.9. Not applicable for CRL.

CRL 25. Electrical equipment cabinets

CRL 25.2. Drive and main control system cabinets

CRL 25.2.3 Not applicable for CRL.

CRL 27. Remote escalator status indication (Station Operations Room)

CRL 27.1. General requirements

CRL 27.1.2. Not applicable for CRL.

CRL 27.2. Construction

CRL 27.2.1. Not applicable for CRL.

CRL 27.4. Wiring

CRL 27.4.1. Not applicable for CRL.

CRL 27.4.2. Not applicable for CRL.

CRL 27.4.3. Not applicable for CRL.

CRL 27.4.4. Not applicable for CRL.

CRL 28. Electrical components – General

CRL 28.9. Safety notices and identification labelling

CRL 28.9.5. d) Mandatory notice, blue background, with white lettering: “Inform Station Supervisor if escalator immobilisation/isolation required”. Nominal size of label: 150mmx100mm.

CRL 31. Lighting

CRL 31.1. The provision of lighting in the vicinity of the escalator is the responsibility of the *Contractor*. For lighting design and levels, refer to the following CRL strategies and LUL Engineering Standard:

a) C100-ATK-N2-RSP-CR002-00001: Architectural common components design stage F1 specification – JX10 Extract;

b) C100-ATK-N2-RSP-CR002-00001: Architectural common components design stage F1 specification – JV21 Extract;

c) C100-ATK-N2-RSP-CR002-00001: Architectural common components design stage F1 specification – JY73 Extract;

d) C100-ATK-A-RST-CRG02-50001: Escalator constructability & maintenance C100 Architectural Components;

e) 1-066: Lighting of London Underground Assets.

CRL 31.2. Decking mounted luminaries shall comply with the design requirements of CRL drawing C100-ATK-A-DDD-CR001_Z-53001.

Schedule 4

Form of Order

Transport for London
London Underground Limited

Purchase order

Vendor address

Contact

Requested by :

Telephone :

Invoice to

London Underground Ltd
Accounts Payable
1st Floor
PO Box 45276, 14 Pier Walk
London SE10 1AJ
Telephone: 0845 303 5100
Fax: 020 3054 5331
email: accountspayable@tfl.gov.uk

Information

Purchase order no. :
Creation date :
Vendor no. :
Currency :
Payment terms :

Delivery address

London Underground Limited
55 Broadway
London
SW1H 0BD
Or as agreed below

Instructions to vendor

The supply of goods/services under this purchase order is subject to the Purchase Order Conditions which are available on www.tfl.gov.uk or available upon request from the contact named below. Supply of goods or services under this purchase order indicates your acceptance of such conditions.

Item	Description	Quantity	UM	Net price	Total price

Procurement Department: **Date:**

Schedule 4A

Payment Procedure

1. The company will pay the Supplier the Price in the following manner:

1.1 At the end of each Accounting Period calculated from the Start Date, the Supplier will be entitled to submit an invoice to:

Accounts Payable
PO Box 45276
14 Pier Walk
London
SE10 1AJ

1.2 The Invoice(s) submitted by the Supplier must always quote a relevant Company transaction number. The Invoice(s) must be clear, concise, accurate and adequately descriptive to avoid delays in processing and subsequent payment. VAT must be shown separately. Any loss or additional costs incurred by the Supplier in the correction or re-submission of an Invoice will be at the Supplier's expense.

1.3 If the Invoice is approved by the Company then the final date for payment of that Invoice will be thirty days after receipt by the Company of the Suppliers Invoice.

1.4 If the Invoice is not approved by the Company then the Company shall inform the Supplier within ten Business Days of the receipt of the Invoice has not been approved.

1.5 Payments shall be made by Bank Transfer (Bank Automated Clearance System-BACS) or such other method that the Company may choose from time to time.

1.6 For abatements related to the Supplier's performance (as detailed in clause 11 of the Conditions of Contract and Schedule 8 of the Contract) and payment of the Volume Discount (as detailed in Clause 31 of the Conditions of Contract and Schedule 4 of the Contract), the Supplier shall pay the Company in the following manner:

The company will issue an Invoice to the Supplier and payment will be made within 30 days of receipt of the Invoice.

Schedule 4
Contract Variation Procedure

1 The cost of any Variation Order shall be agreed between the parties taking account of the reasons why the Variation Order was required.

2 The Company may propose a variation by completing Part A of the Variation Proposal and supplying three (3) copies of it to the Supplier. Within five (5) Working Days of receipt, or such other time as may be agreed by the Company, the Supplier shall complete Part B of the Variation Proposal and shall supply two (2) copies of the Variation Proposal to the Company. The Company shall be entitled, at any time within thirty (30) days of receipt, to instruct and authorise the Supplier to proceed with the variation on the terms so set out by each party by completing and signing Part C of one copy of the Variation Proposal (which, following such signature, will be referred to as a "**Variation Order**") and supplying such Variation Order to the Supplier. The relevant part(s) of the relevant Contract shall thereupon be varied accordingly.

3 The Supplier may propose a variation, after requesting the issue by the Company of a Variation Proposal variation number, by completing Parts A and B of a Variation Proposal and supplying two (2) copies of it to the Company. The Company shall be entitled, at any time within thirty (30) days of receipt, to instruct the Supplier to proceed with the variation on the terms so set out by the Supplier by completing and signing Part C of one copy of the Variation Proposal (which, following such signature, will be referred to as a "**Variation Order**") and supplying such Variation Order to the Supplier. The relevant part(s) of the relevant Contract shall thereupon be varied accordingly.

4 The Supplier may indicate in a Variation Proposal that the price is an estimated price but, if it does so, it shall supply a firm price to the Company in writing at least seven (7) days before the expiry of the time within which the Company is entitled to instruct the Supplier to proceed with the variation.

5 The price indicated by the Supplier must be the full price and shall cover all costs associated with the variation. If appropriate a range of prices may be shown corresponding to the quantity of Goods to be supplied and extent of the Services to be carried out.

6 In an emergency, both parties shall use their reasonable endeavours to expedite the actions permitted or required under the Contract Variation Procedure.

7 The Company will not accept any retrospective claims for additional work caused by a variation which has not been approved by the Company in accordance with the Contract Variation Procedure before the commencement of such additional work.

8 All authorised additional work resulting from any Variation Proposal shall be priced in accordance with any applicable rates set out in.

9 The Supplier shall at all times act reasonably and shall price each Variation Proposal at the least possible additional cost to the Company that it is reasonably and economically practicable for the Supplier to offer and which has the least possible impact on the terms of the Agreement and the relevant Contract, including, but not limited to the Specification and the Order Programme.

10 Strict adherence to the procedure described in this Schedule 5 shall be a condition precedent to any addition to the price for the Goods and Services. If the Supplier does not adhere to each paragraph in this Schedule 5 then the Supplier shall not be entitled to any addition to the price notwithstanding that the Supplier may have supplied additional or varied Goods and/or Services.

Appendix 1

Form of Variation Proposal/Variation Order

To:	From:

Contract Reference Number:
Order Number:
Variation Number:
Variation Title:

PART A (TO BE COMPLETED BY THE ORIGINATOR OF THE VARIATION ORDER)	
Description of change:	
Reason for changes and impact (if any) on Contract:	
Variation Proposal Authorised by:	**Proposal Date:**

PART B (TO BE COMPLETED BY THE SUPPLIER)	
Price Breakdown Note: If a further breakdown is needed please append details as a separate sheet.	
Expected Order Delivery Date and/or Order Completion Date:	
Supplier's Representative: **Print Name:** ..... **Signature:** ..... **Date:**	
Completed document to be returned to the Company's Representative	

PART C (TO BE COMPLETED BY THE COMPANY'S REPRESENTATIVE)
Comment on Parts A and B:
Variation Authorisation **Company's Representative:** **Print Name:** ..... **Signature:** ..... **Date:** .....

Schedule 5

QUENSH Health Quality and Safety Plan

Standard Category | 1 |

S1552 A18 Contract QUENSH conditions

Please read the written notices

Contents

1 Purpose

The purpose of the Contract QUENSH (Quality, Environmental, Safety and Health) Conditions is to control risk down the supply chain for contracted work on LU Operational Property or other LU premises which affect / impact upon the operational railway.

QUENSH enables the Client to identify, against the particular package of work, what risks need to be considered during implementation. The relevant QUENSH requirements can then be agreed with the Supplier and applied to the contract to mitigate those risks.

QUENSH is therefore a document which will enable suppliers working under an agreement with LU to cascade the appropriate LU requirements down their supply chain to ensure that risks are understood and controls embedded in plans and working arrangements.

Note: The requirements detailed in this standard are in addition to legislative requirements, British and European standards, industry good practice and other Category 1 Standards.

2 Scope

QUENSH applies to every contract for works, activities or services supplied to LU which take place on LU Operational Property or other LU premises which affect / impact upon the operational railway. The Client determines the relevant conditions on the basis of risk associated with the works, activities or services.

The Client may apply QUENSH, in its entirety or in part, to any other contract that affects LU's business.

The project scope will determine the standards, or parts of standards, that must apply.

Where a concession may be required to an applicable standard, the relevant LU client representative must refer to LU standard S1641 "Concessions to Standards".

When a project is underway, new or changed standards must not be used to vary scope, particularly beyond design 'freeze', unless the change relates to a change in law or there is a demonstrable cost benefit.

3 Roles and responsibilities

The application of QUENSH and the relationship that shall be applied between the Client and Supplier is defined below and described further in Attachment 1.

3.1 The Client

The Client shall:

1) be responsible for ensuring the requirements outlined in this standard are managed in all contracts where they are applicable

2) identify the point of contact that will represent the Client's organisation.

This representative shall be responsible for ensuring compliance with LU's Standards and processes. This work may be amalgamated within other recognised roles, within the Client's organisation.

3.2 The Supplier

The Supplier shall be responsible for managing the activity of the Supplier's organisation and their supply chain so that compliance with the QUENSH Contract Conditions and the associated LU standards is achieved.
The Supplier shall:

1) be responsible for satisfying QUENSH requirements applicable to the works

2) have or develop a comprehensive knowledge of the QUENSH Contract Conditions and the associated LU standards

3) have or develop an understanding of how 'works' can impact on the operational railway, including LU staff, customers and assets

4) ensure that all suppliers forming part of the supply chain (sub-contractors) comply with all applicable QUENSH Contract Conditions and associated LU and Tube Lines standards

5) upon contract award, the point of contact who will represent the Supplier's organisation and their supply chain, where applicable.

This representative shall assure the Client that full compliance with QUENSH is being achieved within the supplier organisation and its supply chain, where applicable. This work may be amalgamated within other, recognised roles within the Supplier's organisation.

Note: The intention is to accommodate this work within the Supplier's project team without creating a specific role; the point of contact shall be a co-ordination function.

4 Agreement of the applicable QUENSH contract conditions

The QUENSH contract menu (form F0780) or the contract shall be used by the Client to identify and apply relevant requirements to particular packages of work.

The applicable conditions shall be identified by competent persons.

Where a QUENSH menu is produced, it shall be issued as a part of the Invitation to Tender (ITT).

The Supplier shall evaluate the scope of work against each condition selected by the Client on the menu as being applicable. If the Supplier's selection of requirements differs from the Client's then the Supplier shall give a clear explanation of the reason for these differences as part of the tender.

Differences in the Client and Supplier menu selections will be discussed and resolved with the Client's representative at subsequent tender review meetings.

The agreed version of the menu selections shall form part of the contract in that it shall be complied with by Suppliers and their supply chain.

The menu shall be updated by the Client for agreement by the Supplier if the contract is subsequently varied to include significantly additional, or different, works or services.

5 Supplier's selection of sub-contractors

The Supplier shall ensure that its procurement management system evaluates and selects sub-contractors not solely on the basis of cost but also for their ability to meet LU requirements. The Supplier shall provide with their tender details of the basis for the selection of all proposed sub-contractors and how they are selected.

6 Identification of Safety Critical Activities

Suppliers shall identify all Safety Critical Activities associated with the Contract and submit details with their tender. LU Safety Critical Activities shall be identified as set out in legislation and LU standard S1548 'Safety Critical Work'. Agreement shall be reached with the Supplier regarding which Safety Critical Activities are associated with the Contract.

The Supplier shall regularly review the method of work and identify any further safety critical tasks for agreement with the Client before starting that activity.

7 Works environmental management

The Supplier shall develop and document arrangements for managing environmental impacts.

The Supplier shall:

1) ensure that the arrangements demonstrate the approach and structure of the necessary environmental management to be employed on the Contract

2) maintain and periodically review the arrangements and forward amendments to the Client.

8 Emergency Plan

The Supplier shall prepare Emergency Plans relating to fire and other health, safety and environmental emergencies and ensure that all personnel are aware of the arrangements in them. The Emergency Plan shall define the arrangements, procedures and measures that will be implemented to eliminate or minimise the identified hazards and the potential hazards, including those specified by the Client. The Plan shall:

1) clearly state the procedures to be adopted for each emergency

2) list the duties and responsibilities of personnel on site

3) identify a senior site official with responsibility for liaison with the emergency services and

4) include the names and telephone numbers of the Supplier's staff (including mobile telephones if applicable) who can organise or assist with emergency action (including safety, fire or environment) in the event of an incident occurring on the site outside normal working hours or when the Supplier is absent from the site.

All such plans shall reflect and be complementary to local LU evacuation procedures.

The Emergency Plan shall be kept at site along with any other documents, posters or notices required by law or directed by the Client. Where the works, activities or services being provided is carried out on an 'ad hoc' basis, e.g. fault repair, the Emergency Plan shall always be available on site while work is in progress. The Supplier shall provide the Client with a copy of the Emergency Plan.

9 Method statements

The Supplier is free to use its own format for method statements; LU does not mandate a specific format. However, the LU supply chain has developed a method of producing and briefing a safe method of work to the labour force. Copies of the templates can be obtained from LU's Approved Products Register at www.lu-apr.co.uk by registering and then searching for SMoW or selecting product ID 479.

Note: The use of this format is not mandatory, but suppliers are free to use it or adapt it to suit their works.

10 Health, Safety and Environment File

The holder (LU or Tube Lines) of stored Health, Safety and Environmental file information and any other stored health and safety information on the known or potential hazards and risks that are present at a location shall supply the information to any party requesting it who is either engaged or potentially involved in work at that location.

11 Pre-start LU health, safety and environment meeting

The Client shall determine the need for an LU specific pre-start health, safety and environment meeting. Where required the Client shall invite (as appropriate) representatives from the London Fire and Emergency Planning Authority (LFEPA), LU, Tube Lines Fire Safety Manager or relevant fire protection task engineer, relevant safety and environmental regulators, the Supplier's representative, Supplier site representatives and any specialist representatives (such as the LU or Tube Lines Asbestos Control Units) to attend a pre-start meeting.

If appropriate the Client shall also invite a representative from the British Transport Police to attend the pre-start health, safety and environment meeting to discuss work likely to affect passenger flow and movement in stations, crime prevention and general security.

Appropriate attendees shall also be invited to visit the site on a regular basis. The Supplier shall comply with any instructions from the Client resulting from these visits.

12 Supplier's site induction

The Supplier shall ensure that their personnel and any visitors to the site are made aware of the Supplier's health, safety and environmental requirements specified in the Contract relevant to site safety.

13 Site Person in Charge

A declaration of the competence of the Site Person in Charge, contained in form TSW 035 available from the Client, shall be signed by the employing manager which shall deem that the Site Person in Charge has the necessary supervisory skills and sufficient knowledge on the technical, health, safety and environmental aspects of the scope of the work to act in the capacity of the Supplier's Site Person in Charge.

Where the Site Person in Charge will be working in an area defined as 'track', the roles and the responsibilities of a Site Person in Charge, including the additional requirements for their appointment, can be found in the following Rule Books:

1) Rule Book 14 'Possession planning and management'
2) Rule Book 15 'Possession protection methods'
3) Rule Book 16 'Going on the track in Engineering Hours'
4) Rule Book 20 'Engineering staff - Traffic Hours protection'

Copies of the Site Person in Charge Declaration Form (TSW035) which can be used for both Track and Non-Track purpose can be found on the Rule Book intranet site.

14 Staff requirements

14.1 Behaviours

14.1.1 Alcohol and drugs

In compliance with LU standards S1251 'Alcohol and work' and S1257 'Drugs and work' and the Transport and Works Act, all Suppliers' staff are prohibited from consuming alcoholic drinks or consuming or using drugs at work, or from being under the influence of alcohol, drugs or other substances that might impair the proper performance of their duties on LU's Premises.

A DAMSP (Drugs Alcohol Medical Screening Programme) Certificate shall be carried by the Supplier's personnel at all times where they are undertaking Safety Critical Activities.

Suppliers shall conduct unannounced drugs and alcohol testing of at least 5% of their workforce that undertake Safety Critical Activities per annum.
Testing for drugs and alcohol, certification and evidence

When required by the Client, the Supplier's personnel shall co-operate by providing breath tests or specimens for analysis in the following circumstances:

1) prior to starting the Contract or an approved training course
2) annually
3) unannounced and on a random basis in addition to testing for any other reason
4) when suspected of an infringement of a legal requirement
5) following an incident.

Failure to comply with this requirement may result in civil or criminal action against the individual, the Supplier or both. Testing will be undertaken at the Supplier's expense. Information on laboratories approved by LU for alcohol and drugs screening is available from the Client.

Records of testing shall be produced by the Supplier on request or at specified intervals as determined by the Contract. Records of individuals who have failed to meet LU's requirements shall be supplied to the Client and made available to LU.

14.1.2 Control of hours worked

The longest shift in any roster shall be 12 hours.

The minimum amount of rest between any two shifts shall be 11 hours.

Suppliers shall comply with the Working Time Regulations and any subsequent amendments. As determined by the Supplier, the consecutive days that may be worked before a rest period when working on, over or adjacent to the railway shall be either:

1) six consecutive days, followed by a rest period of not less than 24 hours
2) 12 consecutive days, followed by two consecutive rest days, each of which is not less than 24 hours
3) Within any 14 day period, two rest periods, each of which is not less than 24 hours.

In calculating the numbers of hours worked by personnel, the Supplier shall take fully into account those hours worked for any other Supplier.

The Supplier shall maintain records of employee's working hours and these shall be made available to the Client, immediately upon request, for monitoring and audit purposes.

14.2 Control of hours worked

14.2.1 Working Time Regulations

Suppliers shall comply with the Working Time Regulations and any subsequent Amendments. This shall include, but is not limited to:

The minimum amount of rest between any two shifts shall be 11 hours.

As determined by the Supplier, the consecutive days that may be worked before a rest period when working on, over or adjacent to the railway shall be either:

1) six consecutive days, followed by a rest period of not less than 24 hours
2) 12 consecutive days, followed by two consecutive rest days, each of which is not less than 24 hours
3) within any 14 day period, two rest periods, each of which is not less than 24 hours.

In calculating the number of hours worked by personnel, the Supplier shall take fully into account those hours worked for any other Supplier.

The Supplier shall maintain records of employee's working hours and these shall be made available to the Client, immediately upon request, for monitoring and audit purposes.

14.2.2 Fatigue

Adherence to the Working Time Regulations does not manage the risk of fatigue and suppliers shall implement controls to reduce, so far as is reasonably practicable, risks arising from employee fatigue. The control of risk from fatigue is needed even if there is no shift work, significant overtime or safety critical work being undertaken.

In considering the risk of fatigue, suppliers shall include but not limit their controls to:

1) the longest shift in any roster shall be 12 hours. When working nightshifts, consideration to reducing the shift length shall be given due to the increased risk of fatigue
2) the door to door time (combined travel time and work time) shall not be planned to exceed 14 hours.

Special consideration shall be given to first night shifts due to the change in work/sleep patterns.

Suppliers shall have suitable systems in place to demonstrate how they manage risks associated with fatigue, which shall include the use of suitable fatigue assessment methods to assess proposed work patterns and actual hours worked.

This shall include the identification and assessment of work patterns for other employers.
Suppliers shall refer to the Office of Road and Rail document “Managing Rail Staff Fatigue” or the Health & Safety Executive document “Managing Shiftwork” (HSG256) as appropriate for guidance on managing fatigue in railway and non-railway staff.

In addition, where safety critical work as defined in LU Standard S1548 ‘Safety Critical Work’ is identified, suppliers shall submit detailed rosters and associated fatigue risk management plans which will include, but are not limited to, fatigue risk assessments.

14.3 Knowledge

14.3.1 English language

The default language for all Suppliers and services to LU shall be English and this requirement shall extend to:

1) oral communications
2) all written communications and instructions including any training or technical material provided by any Supplier following the modification, renewal or replacement of any asset.

Those staff that have responsibility for managing the Contract and the Supplier's personnel whilst they are working on LU Premises shall be able to communicate in both written and oral English to a standard appropriate to the tasks being performed.

The Client may permit the presence of Supplier’s team members who are not competent in the English language provided that the Supplier can demonstrate to the satisfaction of the Client that:

1) such team members will receive the required safety training/briefing (including any emergency procedures) before commencing work
2) the Supplier will make appropriate arrangements to ensure that instructions are effectively communicated to, and understood by, all such team members.

14.3.2 Access card and worksite briefing

All Supplier personnel who work on LU Premises shall be able to evidence by approved methods that they have successfully attended an LU specific Health & Safety induction as set out in LU Rule Book 10 – ‘Station accesses.

Suppliers shall maintain records of all the operatives attending the briefing. These records shall be made available to the Client upon request.

14.3.3 Visitors to sites

Visitors who are accompanied by a suitably competent and licensed Tube Lines or LU staff need not hold an LU access card nor complete the worksite briefing where they are not undertaking any physical work; where their presence on site is

not interfering with any work; where they are not going on or about the track in either Engineering or Traffic Hours, or anywhere where their presence places neither themselves or others at any risk.

14.4 General competence

14.4.1 Evidencing competence of safety critical staff

The Supplier shall demonstrate the competence, medical fitness, qualifications and training of safety critical staff as set out in LU Standard S1548 'Safety Critical Work'.

14.4.2 Identification of safety critical staff

The Supplier shall provide a means of identification for all staff employed on safety critical works as set out in LU Standard S1548 'Safety Critical Work'.

14.4.3 Competent external safety critical personnel

The services of Protection Masters, Train Masters, Possession Masters and Cable Linemen shall only be procured from organisations that have demonstrated themselves to be competent to provide such services.

14.4.4 Training

The Supplier shall ensure that its staff and those of its appointed supply chain) are competent, fully aware of QUENSH requirements and the controls and process to manage the risks pertinent to both the works and individual staff roles.

Where required by the Contract and before starting work on site, the Supplier's personnel shall attend and achieve the required standard in the courses agreed with the Client. These courses will cover the rules, procedures and instructions to ensure that staff are safe on or about the operating railway. Training can only be provided by an LU Accredited Training Provider.

Supplier's personnel attending any of LU safety training courses shall not have performed work in the 11 hours preceding the start of the course and be sufficiently alert and awake as to derive full benefit from the course.

Note:	Attendance at an LU accredited course shall be considered to be the equivalent of performing work for the duration of the course. The Accredited Training Provider will issue a certificate to the Supplier's personnel who have successfully completed a course. This certificate shall be carried at all times whilst on duty. The certificate will not be renewed on expiry unless the Supplier's personnel have attended and passed the appropriate refresher training course.

All training certificates issued by an Accredited Training Provider remain the property of LU and are valid for the duration stated on the certificate. No certificate shall be valid if it has been defaced.

14.4.5 Asset specific competence

Suppliers shall demonstrate to the Client the competency to perform works on specific assets as required by the governing standards.

14.5 Medical requirements

All Suppliers shall comply with LU's medical requirements as set out in LU standards S1601 'Management arrangements to assure medical fitness' and S1602 'Corporate medical standard for personnel requiring safety on the track certification'.

14.6 Identification of Suppliers staff

The Supplier's personnel and their sub-contractors shall wear high visibility clothing which carriers the Supplier's company name, at all times when on or about the operational railway.
The Supplier's staff shall not wear LU branded high visibility clothing, unless working under a "labour only" contract and requested to do so by the LU Project Manager.
High visibility vests shall comply with the requirements of LU Standard S1483 'High visibility clothing for going on or near the track'.
Where, following a risk assessment, the wearing of a separate high visibility garment could produce a risk of personal injury, and then the Supplier shall agree other arrangements with their LU point of contact to ensure that the Supplier's staff and sub-contractors are easily identified.

14.7 Clothing

Suppliers shall not wear any garment or article that impedes their vision or hearing when working on LU infrastructure, unless required as part of a safe system of work, e.g. hearing protection.

The wearing of hats, clothing with hoods and any other headwear is prohibited when working on LU infrastructure with the exception of:

- hoods or headwear required as PPE in response of a risk assessment
- headwear specifically designed:

1) to be compatible with PPE **and**
2) not to impede vision or hearing.

15 Permits and licences

15.1 LU specific permits and licences

Permits and licences shall be required for:

1) movement of materials (see clause 35.1 'Conveyance of loads on lifts and escalators')
2) storage of materials (see clause 44 'Storage')

3) access to sub-stations, electrical switchrooms, equipment rooms and signal equipment rooms (see clause 40 – 'Access to electrical sub-stations, working equipment, relay and other secure rooms

4) Access to electrical sub-stations, working equipment, relay & other secure rooms' and 41 'Entering areas with gaseous fire suppression systems')

5) Working in the lift or escalator environment (see clause 37 'Working in or near lifts and escalators')

6) Hot work and fire hazardous work operations (see clause 43 'Hot work and fire hazards') and

7) Visiting LU operational locations (see clause14.2.3 'Visitors to sites').

Where licences or permits are required, the Supplier shall ensure they are prominently displayed at all times during the work period and in a position and manner approved by the Client. If the licence or permit is defaced, removed or obstructed without authority, the Supplier shall apply for it to be replaced immediately.

The Supplier shall apply for permits or licences to the Client at least 14 days prior to the proposed commencement date.

Permits, certificates and licences are issued on an individual basis and are not transferable to other persons or companies. If any of these documents are lost or damaged, the Supplier must advise the Client as a matter of urgency.

15.2 Permits, licences and certificates for Supplier's staff

Suppliers shall:

1) hold a record of all licences, permits and certificates issued to its staff by LU or Accredited Training Providers

2) ensure that their staff carry their DAMSP (Drugs, Alcohol Medical Screening Programme) certificates and relevant training certificates

3) allow sufficient time to ensure that its staff are properly trained and registered before starting work on the Contract.

If the Supplier's staff fail to produce the stipulated licences when requested to do so by any member of LU staff, they shall be required to leave the LU Premises immediately. No cost or delay incurred by the Supplier as a result of such a failure will be accepted by LU.

16 The principles of access

16.1 Introduction

Access to the LU network is controlled by separate but interdependent regimes.

16.2 Access to stations

All Suppliers shall access LU station premises in accordance with Rule Book 10 'Station access'. Suppliers shall seek access to the station via the LU Access department.

All Supplier staff shall be able to evidence by approved methods that they have successfully attended an LU specific Health & Safety induction. Additional authority will be required to gain access to any secure equipment room.

The person leading the group must be competent to act as a Site Person in Charge:

- for non-track locations by a letter of authorisation from their accountable manager.

16.3 Access to the track

Access to London Underground Railway track and the protection required to permit this shall be in accordance with the following Rule Books:

1) Rule Book 14 'Possession planning and management'
2) Rule Book 15 'Possession protection methods'
3) Rule Book 16 'Going on the track in Engineering Hours'
4) Rule Book 17 'Managing access to the track in Engineering Hours'
5) Rule Book 20 'Engineering staff - Traffic Hours protection'
6) Rule Book 21 "Personal safety on the track".

For access to the track where Network Rail rules apply, Network Rail protection standards must be complied with. LU will allow the Supplier's personnel access to reach the site locations via the railway using an authorised route, except where there is public access.

Permission to carry out work on LU infrastructure must be granted by the LU Access department. Access applications, particularly at interchange and interface locations, may require permission to be granted by more than one party.

16.4 Access to depots

Procedures for gaining access to a depot are set out in LU Rule Book support document 'Depots and sidings'.

All non-emergency work or non-call staff work must be requested in advance from the LU Access department. Once approved by the LU Access department, work will be published in the Engineering Notice Look Ahead and Engineering Notice. Before starting work, staff must obtain permission from the designated person responsible for the depot concerned.

17 Applying for planned access

17.1 Introduction

All access requests, including those of PFI suppliers, third parties and suppliers contracting with Tube Lines, shall be made via the Worksite Request System, and then processed by the Access department. A booking reference number will be issued to the supplier once the request has been operationally reviewed, clash checked and approved.

18 Applying for General Access

General Access (GA) is a category of access for undertaking non-exclusive / non-rstrictive works on LUL infrastructure, using all necessary tools and equipment. Booking reference numbers may be valid for up to a whole financial year, but may also be issued for shorter time periods to suit work demands.

18.1 General Access

This will be granted at the discretion of the Access manager, if the nature of the work meets the requirements for a General Access application. Constraints that apply to general access.

A Supplier shall only undertake GA activities that have been previously agreed by the LU Access department. Only those companies or departments authorised for General Access shall carry out these activities. (This may include sub-contractors, but they will be working under the main Supplier title and it will be the responsibility of the main supplier to manage this process). Planned Work shall be given precedence over GA activities. A General Access booking reference number will be provided for each GA activity being undertaken Requests for GA shall be made at the notice period set out in contractual documentation before start on site. Bookings will be authorised for periods up to 12 months.

19 Access for fault repair

Access in response to a reported fault is managed differently to planned access. By definition it is not for planned works ordered through the PPP, PFI or another contract. Faults are reported to a Fault Reporting Centre (FRC). For each job raised in response to a reported fault, a unique fault reporting number is allocated. The fault number is the equivalent to a SABRE Number and can be used to gain access to a station or the track for the purpose of rectifying the reported fault. Only recognised fault numbers are acceptable ‘access numbers’ to entitle the Supplier access onto the station to fix the fault. Any fault number presented to the Track Access Controller (TAC) when access to the track is being requested must be supported by verification of the number, work site and work description being supplied to the TAC by the FRC. These details are normally faxed direct to the TAC by the FRC. Fault rectification works do not require an Operational Assurance Certificate. A safe system of work must be established and applied at all times.

Note:	In Traffic Hours at busy stations, it is strongly advised that the Supplier contact the Customer Service Supervisor or the Customer Service Manager before attending site. There may be working restrictions due to passenger volumes. It may be necessary to rectify the fault overnight in Engineering Hours.

20 Operational Assurance

Operational Assurance (OA) approval (by LU) is required when planned engineering work could impact on station or train operations. The criteria for this are set out in LU Standard S1538 'Assurance', Section 3.9 'Supplementary requirements for the assurance of works impacting on the operational railway'. The OA process ensures that, for planned work on LU Premises, which may have an operational impact, the relevant LU operational/access manager has been assured that:

1) safety risks to customers and staff are being managed to As Low As Reasonably Practicable (ALARP)

2) suitable consultation has taken place between the operational / access managers or their nominated representatives and those conducting the work.

Application to the relevant LU operational/access manager for OA shall consider ongoing operational inspections and consultation with regard to cross boundary issues. Work cannot take place and access bookings will not be published in the Engineering Notice or the Station Works Plan (SWP) unless OA has been received and accepted by the relevant LU manager for the site. Access bookings may be made in advance of OA being granted.

21 Closures and possessions

21.1 Requirements for Closures

Where works will affect normal LU Station or Trains operation the Supplier shall request a Closure. Application is made on a Closures Request Form and must be submitted to LU 540 days in advance of the proposed date for a Major Closure and 222 days in advance of a Minor Closure, as required by the contractual documentation. Shorter notice may be accepted by LU at its discretion. Major closures are those which occur between 06:00 and 21:00 Monday to Friday, excluding any works which are lift and escalator based. Closures outside this time are deemed Minor Closures or station closures.

21.2 Requirements for possessions

The requirements for planning and managing possessions are specified in LU Rule Book 14 'Possessions planning and management' and Rule Book 15 'Possession protection methods'.
For possessions involving other infrastructure controllers or equivalent, the site owner's procedures and Site Specific Engineering Agreements must also be applied. A representative from the other organisation must attend the possession planning meeting, at which:

1) protection of the possession area beyond the procedural boundary must be arranged with the representative from the other organisation. The agreed details must be published in the Engineering Notice and the other organisations' Weekly Operating Notice or equivalent publication

2) it must be agreed which method of protection will be used and what means of communication will be established between LU and the other organisation. Except for emergency possessions, details of all possessions must be published in the Engineering Notice.

22 Controls at point of access

22.1 Publication of works

All planned work, after approval, is "published" in one of the following:

1) the Traffic Circular and Engineering Notice Look Ahead for trains or possessions, exclusive/restrictive access etc. on the track
2) the daily Engineering Notice
3) the SWP for stations
4) the GA Plan
5) the SABRE system.

Planned Work cannot take place unless published in one of the above.

22.2 Checks at point of access

The Supplier must be prepared to show evidence of:

1) booking reference number (including GA) or fault number
2) appropriate Personal Protective Equipment (PPE)
3) that they have successfully attended an LU specific Health & Safety induction along with other, certificates and licences as appropriate.

The Supplier shall ensure that copies of the relevant Health, Safety and Environment arrangements and safe systems of work are readily available at work sites.

22.3 Signing in with the Customer Service Supervisor/Manager

The Evacuation Register and Person in Charge Evacuation Register (PICER). All persons seeking access shall sign on with the customer service supervisor/manager and shall complete the Person in Charge Evacuation Register (PICER) and comply with the requirements of Rule Book 10 'Station access'.

22.4 Person providing protection

22.4.1 Person providing protection

The roles and responsibilities of the Protection Master/Protecting Workers on the Track are set out in the LU Rule Books, including:

1) Rule Book 15 ‘Possession protection methods’
2) Rule Book 16 ‘Going on the track in Engineering Hours’
3) Rule Book 20 ‘Engineering staff - Traffic Hours protection’

22.4.2 Possessions

The Possession master takes responsibility for access to the area under possession and safety within the entire area of a possession. No one can enter this area without first receiving permission from the Possession Master. The other personnel listed above are dedicated protection resources which may be required for a possession. Information on possessions, including roles and responsibilities for the Possession Master is contained in Rule Book 14 ‘Possessions planning and management’.

23 Removal of Supplier’s personnel from LU Premises

Suppliers shall take appropriate actions to prevent and eliminate unacceptable behaviour or conduct. The Client reserves the right to object to and (where appropriate) immediately expel any of the Supplier's personnel or supply chain employed on the works.

24 Incidents

All Suppliers shall have contingency plans and remedial measures for incidents, including provision of support for individuals experiencing trauma as a consequence of an incident. All Suppliers shall comply with LU standard S1556 ‘Incident Reporting and Investigation’.

25 Notification of regulatory concern or action

The Supplier shall notify the Client representative of any regulatory concern or action by the end of the following working day. The notification shall include a description of the concern or action, the response and any additional information to aid understanding. Copies of any communication in connection with the regulatory concern or action shall be provided.

26 Confidential Incident Reporting and Analysis System (CIRAS)

Suppliers shall ensure that all staff are aware that they can contact the CIRAS on FREEPHONE 0800 4 101 101 at any time, shall they wish to report (in complete confidence) any matter of health, safety or environmental concern, where existing reporting systems are considered to have been ineffective or inappropriate. Suppliers and their employees and supply chain shall co-operate fully with any investigation arising from the use of CIRAS.

27 Monitoring

27.1 LU inspections

A schedule of site inspections may be required by the Client as part of the arrangements made to provide assurance.

27.2 Monitoring the supply chain

The Supplier shall monitor the performance of its staff and its supply chain and ensure that the results are used to:

1) control their activities
2) assess its suppliers' suitability for future works.

These results (records) shall be made available to the Client upon request.

27.3 Health, safety and environmental surveillance by the Supplier's personnel

The Supplier shall submit to the Client details of the Supplier's proposed level of site health, safety and environmental surveillance together with the nomination of health, safety and environmental supervisors and officers who will have an overview of all site health, safety and environmental matters. Such details shall include outline programmes for:

1) safety tours and detailed safety inspections
2) the auditing of site activities to ensure that the correct health, safety and environmental management procedures are followed.

27.4 Work location inspection and audit

All Suppliers shall provide full and free access to LU and the Client for the purpose of carrying out audits and site inspections to monitor compliance with the health, safety, quality and environmental conditions attached to their Contract.
The Client (or their agents) may at any time undertake inspection of the equipment and audit or check any aspect of the Supplier's performance of the Contract. The Client (or their agents) shall inform the Supplier of the objective of any audit prior to its commencement.

The Supplier will promptly provide all reasonable co-operation in relation to any inspection, audit or check including:

1) granting access to any premises, equipment, plant, machinery or systems used in the Supplier's performance of the Contract, or where such premises, equipment, plant, machinery or systems are not the Supplier's own using reasonable endeavours to procure such access
2) ensuring that appropriate security systems are in place to prevent unauthorised access to, extraction of and alteration to data during the audit
3) making any contracts, other documents and records referred to in the health, safety, quality or environment Contract conditions available for inspection

4) providing a reasonable number of copies of any contracts, other documents and records referred to in the health, safety, quality or environment Contract conditions, required by the auditor, or granting copying facilities to the auditor for the purposes of making such copies.

The Client (or their agents) shall have the right to carry out such inspections or audits, as they consider necessary. The Supplier shall make available, at the Supplier's cost, any of their specialist staff as may be agreed necessary for the performance of such inspections or audits carried out by Client (or their agents). The Supplier shall work closely and co-operate fully with the Client and LU personnel on matters of health, safety and environment. The Supplier shall fully and unreservedly accept that responsibility for the safety of the works rests with the Supplier. The participation of LU, Tube Lines staff or their agents in inspections and audits does not in any way absolve the Supplier from that responsibility.

27.5 Timescales for rectifying non-compliances

The Client (or their agents) and the Supplier shall agree the timescale for rectifying any non-conformances or sub-standard conditions that are identified during any audit or inspection.

28 Radio transmitters and transceivers

Suppliers wishing to use radio sets, transmitters and receivers on or about LU Premises shall only do so following agreement from the Client. The Client shall consider:

1) an assessment of any risk arising from (i) the use of such equipment and (ii) the failure to use such equipment
2) output power
3) licence number allocated by Ofcom
4) allocated frequency.

The use of radio transmitters and transceivers in Signal Equipment Rooms is prohibited.

Suppliers shall comply with LU Standard S1193 'Electromagnetic Compatibility (EMC) with LU Signalling System Assets'.

29 Mobile phones

Mobile phones of any description shall only be used when the user is in a place of safety or if there is an emergency. Hands-free mobile phones shall not be used in the track environment or any other environment where it is necessary to receive an audible message. In the track environment mobile phones shall be on silent whilst duties are being undertaken to avoid the risk of distraction to the user or anyone else in the vicinity.

The use of mobile phones in Signal Equipment Rooms is prohibited.

30 Knives

The use of **fixed blade** knives is prohibited on all LU work sites. Work methods shall be designed to eliminate the use of knives. Where the need for cutting cannot be eliminated, a fit for purpose tool (e.g. a cable stripper for stripping cables) must be used. If no other options are available, safety cutters with **automatic** blade retraction must be used as an alternative to open blade knives.

31 Site health, safety and environment committee

The Client shall consider whether or not there is the need for a separate Site Health, Safety and Environmental Committee, consideration shall include the size and extent of the work and also the level of HS&E risk involved.

Where this is the case the Supplier's safety and environmental officer(s) or designated representative shall attend meetings of a Site Health, Safety and Environment Committee or similar meeting established and chaired by the Supplier's representative. The meeting will also include representatives of other Suppliers, major sub-contractors, designated Suppliers, utility companies, other authorities (Fire Brigade, Police, etc.), relevant Health, Safety and Environmental regulators and other specialists as required.

The Client shall be invited to participate.

The Supplier shall assess and implement without delay any decisions or recommendations made by the meeting on matters of health, safety and the environment.

32 Site housekeeping and security

The Supplier shall keep the work location in an orderly state appropriate to the avoidance of danger to persons and avoidance of adverse impact on the environment.

The Supplier shall make the site safe and secure at the end of each shift and shall fit all access doors with suitable locks for this purpose. If work is being carried out on the operating railway, a complete set of keys shall be provided by the Supplier to the Customer Service Supervisor/ Manager after each work shift. (This is for site access only and not for access to pieces of equipment, power supply etc.)

The Supplier shall ensure that the work site is free from all the Supplier's equipment, materials and waste on completion of the works or when the site is returned to normal operations, unless covered by a storage licence. The Supplier shall comply with LU standard S1158 'Track - Inspection and Maintenance'.

The Supplier shall make suitable provision for disposing of unused or redundant assets and materials, and are responsible for determining the correct disposal methods. Consideration shall be given to reusing and recycling these materials. The Supplier shall ensure that the Client is informed of plans for disposing of assets and materials.

33 Accidental damage, obstruction or interference with assets

Should any damage occur to an asset the Supplier shall immediately report the damage to the FRC.

The Supplier is not permitted to rectify the damage for works out of scope as this may increase the risk of a consequential incident. For example, correcting the alignment of a platform camera accidentally knocked could well create a blind spot.

If the damage affects LU operations or if there is a risk to any person the Supplier shall report the details in accordance with the requirements of LU standard S1556 'Incident reporting and investigation' and notify the Customer Service Supervisor / Manager.

34 Delivery of materials

Suppliers shall not deliver materials through public areas of the operational railway during Traffic Hours except with the approval of the relevant LU operational/access manager. Suppliers shall also consider the environmental impacts associated with deliveries in accordance with clause 56 'Noise and vibration'.

35 Conveyance of loads

35.1 Conveyance of loads on lifts and escalators

In Engineering Hours, suppliers shall only convey loads (other than hand-held loads) on escalators and in lifts when in possession of a valid Movement of Materials Licence and valid certificate to enter LU premises.

In Traffic Hours, suppliers shall only convey loads (other than hand-held loads) on escalators and in lifts when in possession of an approved Operational Assurance Notification form, a valid Movement of Materials Licence and valid certificate to enter LU premises.

All loads shall be properly secured at all times to prevent spillage and movement. Materials shall be moved in accordance with the requirements of LU Rule Book 9 'Lifts, escalators and moving walkways', LU standards S1092 'Escalator and passenger conveyors' and S1093 'Lifts including Firefighter and Evacuation Lifts'

35.2 Conveyance of hazardous materials and substances

Suppliers may transport materials and hazardous substances, where approved for use, in the required containment and in a manner addressed and agreed under an accepted safe system of work.

The Supplier shall ensure that all materials for use in sub-surface stations are approved for use or have a valid concession in place for the specific use in accordance with LU Standard S1085 'Fire Safety Performance of Materials - Stations and Tunnel Infrastructure'.

36 Asbestos (non asbestos removal projects)

Prior to any works being undertaken the Supplier shall confirm the presence or absence of any asbestos and the status and condition of the proposed work locations with the Client representative and relevant Asbestos Control Unit. The Client shall provide full contact details of the Asbestos Control Units and information on relevant asbestos registers to the Supplier. The Supplier shall comply with LU or Tube Lines procedures for the management of any identified asbestos.

Where the Supplier believes that they have disturbed asbestos as a consequence of their works, they shall stop work immediately, and notify the Customer Service Supervisor/Manager.

The Supplier shall keep records of any potential exposure to their employees.

37 Working in or near lifts and escalators

Suppliers shall comply with requirements set out in Rule Book 10 ‘Station access’ and the following requirements:

1) only carry out such works when they have a valid permit to enter
2) only carry out works on lifts and escalators when the isolation has been agreed
3) ensure that any of their personnel who apply for a permit possess a valid Lift and Escalator Machine Chamber Access Authority from the LU lift and escalator representative
4) ensure that personnel who wish to work in, or access, a lift or escalator machine chamber, shall possess a lift and escalator machine chamber access pass. This pass shall be to a level commensurate with the nature of the activity to be carried out. For minor visits or inspections, non-certificated personnel can enter the chambers, providing that they are accompanied by someone who is certificated. No more than four persons shall accompany the individual with a pass at one time
5) ensure that a Site Person in Charge (non track locations) is in attendance throughout
6) ensure that, when electrical isolation is required, a warning sign is displayed on the electrical circuit breaker reading ‘WARNING: MEN WORKING - DO NOT SWITCH ON’. The sign shall additionally have the current name and telephone number for the party in possession of the equipment
7) ensure that the appropriate lock-off measures have been taken, i.e. removal and retention of the Castell interlock key (or application of a padlock)
8) ensure that the Site Person in Charge retains the Castell key

9) use secure engineer's safety barriers to lift door openings and the top and bottom of escalators

10) ensure that their personnel are not adjacent to unguarded moving machinery, unless they are specifically licensed to do so, and measures are introduced as the outcome of risk assessments which mitigate risks to ALARP

11) remove all waste materials from the lift or escalator environment at the end of each shift

12) only use lightweight metal ladders (Class 1) in the machine room

13) ensure that, when work is finished, the Site Person in Charge completes section C of the Permit to Enter Form to certify that the machine is fit for service

14) ensure that any person who certifies that a machine is fit for service holds a valid Safety Critical Licence covering the type of activity that has been undertaken

15) ensure that, in the event of the works not being completed at the end of the shift, the Site Person in Charge completes section C of the Permit to Enter Form, informs the Customer Service Supervisor / Manager of the reasons that the machine cannot be put into service, which is recorded in the station logbook

16) not alter any structure or asset without prior written approval from the Client; and

17) ensure that all warning signs are approved by the Supplier's representative and clearly show the Supplier's name and 24 hour contact details.

38 Work on or adjacent to utilities and High Voltage cables (buried services)

The Supplier shall consider the presence of hidden High Voltage cables when planning works. The Supplier shall consult LU as early as possible to ascertain whether any electrical distribution cables or apparatus will be affected by the proposed works.

For High Voltage and Pilot cable records call 020 30548354 (Monday to Friday 09:00 to 17:00) or e-mail LULHVPOWERASSETS@tfl.gov.uk For advice outside of office hours call the LU Shift Supply Engineer on 020 7027 6833 (Auto 145) (24 hours a day).

The supplier shall ensure work methods take account of hidden High Voltage cables. The supplier shall ensure all risk assessments consider such hazards and stipulate the controls required to prevent such hazards being realised. The Supplier shall make all necessary arrangements to safeguard the cables or apparatus. If you require advice regarding methods of work call 020 7918 2667 (Monday to Friday 09:00 to 17:00) or E-mail PlanningPower@tfl.gov.uk

No construction activity may be carried out in proximity of any services unless prior permission has been given by the utility provider and the Client.

If you suspect you have damaged a High Voltage cable do not investigate but call the LU Shift Supply Engineer on emergency number 020 7240 1088 (Auto 945).

39 Working on or about the track

All Suppliers working on or about the track shall comply with the requirements in the following LU Rule Books: Rule Book 16 'Going on the track in Engineering Hours'; Rule Book 20 'Engineering staff - Traffic Hours protection' and Rule Book 21 'Personal safety on the track'. For work on station platforms, Suppliers shall also comply with Rule Book Support document 'Working on a station platform'.

40 Access to electrical sub-stations, working equipment, relay & other secure rooms

When access to a sub-stations is required, the Supplier shall give 6 weeks written notice separately for each site. Access can only be granted to persons who have successfully complied with the Power Supplier Engineer's competency requirements.

Application for access must be made to the LU Power Planning department email: PlanningPower@tfl.gov.uk

When access is required to designate rooms all personnel must have successfully completed the Equipment Room Awareness course, or be otherwise authorised by an appropriate authority after successful completion of other recognised training courses. Keys to these rooms are only issued in response to a specific need submitted in writing to the Client representative. The Client must approve details of the nature and duration of the work and the exact number and location of the workforce. No Supplier shall work in such rooms without authority to do so.

All equipment within such rooms must be protected by a dust-proof screening. The Client must approve the screening before any alteration work is carried out.

The Supplier shall not use such rooms as stores or workrooms.

41 Entering areas with gaseous fire suppression systems

Certain rooms (for example switch rooms, transformer rooms and relay rooms) on LU Premises are currently fitted with a gaseous fire protection system.
Entry into these rooms is not permitted without the Client's approval.

Some extinguished gases released within a confined space are hazardous to health under certain conditions.

42 Fire prevention

42.1 General requirements

Suppliers shall not:

1) dispose of waste or other materials by burning on any site

2) take or store anywhere on the railway any cylinders of industrial or flammable gases and containers of flammable or volatile substances without the prior written permission of the Client and appropriate licence

3) store extremely flammable materials (i.e. flashpoint below 0°C and DERV) under ground; and shall not store any flammable or highly flammable materials except where approved for use on the underground and under storage licence in the quantities and containers specified, and in conditions and locations specified under that licence. This clause does not apply to diesel stored within the fuel tank of a stabled rail vehicle

4) use cookers, gas or petrol heaters and space heaters at below ground locations

5) overload power sockets at any time or use any adapters in connection with electrical equipment and power outlet sockets

6) relocate existing fire points

7) obstruct existing fire points, call points, hydrants and extinguishers ensuring that they are available for operation at all times

8) obstruct or obscure exits, signs and means of access, emergency stairs and doors

9) use, or permit to be used, fire fighting equipment and appliances for any purpose other than fire fighting

10) use or provide dry powder or halon extinguishers

11) install temporary huts made from combustible materials in below ground locations

12) use timber for any works in below ground locations without the prior approval of the Client

13) use polythene or other combustible materials to wrap, encapsulate, or protect any packages, equipment or materials brought in and stored or installed in below ground locations

14) store, or allow to accumulate, any flammable or combustible materials on site, except as authorised under the appropriate LU Standard

15) obstruct, interfere with or remove existing fire plans (kept in secure boxes at station entrances, and sited for use by the local Fire Brigade).

Suppliers shall:

1) ensure that all personnel are fully aware of LU requirements in respect of fire prevention and protection

2) take strict precautions to protect the site, any adjacent property and all persons from fire

3) minimise the quantities of approved flammable materials temporarily stored under storage licence, which shall at all times be the minimum consistent

with safety and construction requirements and never greater than the maximum allowed for that material under the licence

4) remove immediately all empty drums, empty containers, surplus or waste material and used packing materials from operational premises and below ground locations at the end of each working shift

5) minimise all fire risks, including mopping up spillages or absorbing them in sand or other suitable material which shall then be disposed of by the Supplier

6) carry out a risk assessment of the site and arrange adequate fire safety training

7) heat water using electric immersion-heaters

8) use electric convection heaters for space-heating

9) ensure that existing facilities at the site remain accessible

10) request, via the Client representative, the isolation of fire detection equipment when any works may have an adverse impact on the equipment, e.g. smoke or dust, ensure that de-isolations are performed at the end of each period of Engineering Hours unless current exemptions are in place

11) implement a system of hourly checks of the entire site in the event of such isolation being approved

12) provide suitable and sufficient fire fighting equipment throughout the site when the output of a risk assessment indicates an increase in the risk of fire at any work site or when required to do so by the Client

13) provide and maintain fire points in each work area and working level when the output of a risk assessment indicates an increase in the risk of fire at any work site or when required to do so by the Client. In all cases a fire point must be located within 20 metres of each work site

14) ensure that all new extinguishers are painted red and have a coloured band to indicate their type, e.g. 9 litre Aqueous Film Forming Foam (AFFF) extinguisher will be red with a cream band

15) ensure that periodic inspections of the Supplier's fire fighting equipment are undertaken by competent personnel

16) where appropriate nominate person to act as Fire Watchpersons who must hold an LU Fire Watchperson certificate

17) provide the Client representative with full information on moves and consequent changes, however minor, which may affect fire plans

18) prepare emergency plans that reflect LU local arrangements

19) satisfy the requirements of the Client, LU and the Fire Brigade and provide their representatives with the facilities to inspect the fire prevention arrangements on the site

20) make such alterations and additions to the fire protection arrangements as the Client may reasonably require

21) make information available on request to the Client and any other authority that requires it and

22) make adequate provision for raising the alarm in case of fire.

42.2 Temporary fire points

Where identified as being required by either risk assessment or the Client, the fire point shall be constructed in a manner which is easily recognisable.

42.3 Timber

No timber shall be used in below ground locations unless approval is obtained through the Client. No softwood timber shall be stored in below ground locations. It shall be returned to the surface immediately it is not required.

Where the Supplier provides timber that has been treated with fire retardant materials, the Supplier shall, at the time of delivery, provide a copy of all relevant certificates of the fire retardant treatment and treated timber for approval by the Client. Timbers shall be readily identifiable and traceable by a treatment Supplier's stamp or other method approved by the Client.

42.4 Composites

The use of plastics, including polythene and glass fibre resins, shall be avoided. Material shall meet LU's requirements, LU standard S1085 'Fire Safety Performance of Materials - Stations and Tunnel Infrastructure'. The LU Manual of Good Practice G085 'Code of practice - Fire Safety of Materials and Fire Safety of Specific Items and Materials' gives further guidance.

Materials delivered in plastic packaging shall be opened and the packaging removed from site immediately or, in the case of small quantities, by the end of the shift at the latest. The Supplier shall not leave such materials at the site after the end of the shift.

The Supplier shall fill rubbish bags and take these off site in one operation, and not stockpile the rubbish bags. Empty bags shall not be stored on site. Plastic materials shall not be used to form material storage compounds.

Where work has to be protected approved flame retardant non-plastic sheeting shall be used.

Plastic safety fencing shall not be used in areas accessible to the public.

Where it is used in other areas plastic safety fencing shall be checked regularly to ensure it remains properly erected and does not become a hazard in its own right.

Where any plastics are used, they shall be protected from any hot work or other fire hazardous work operations as described in clause 43 'Hot work and fire hazards'. The Supplier shall enforce, stringently, the working arrangements required by the permits.

42.5 Sheeting materials

Only approved materials shall be used on LU Premises below ground.

A list of approved Suppliers of such materials can be obtained from the Client representative.

42.6 Gas cylinders

42.6.1 Use of gas cylinders in below ground locations

Where cylinders are required to be used for cutting or welding purposes the Supplier shall ensure that a Hot Work Permit has been issued for the work site and that all requisite controls are in place.

All industrial gases may only be taken into below ground locations in the quantities permitted and shall be returned to the surface at the end of the work shift and stored as described in clause 42.6.2 'Storage of gas cylinders (above ground)'. Where shift working is continuous, the gases may be left below ground monitored by a Fire Watchperson at all times, provided that:

1) the new shift starts no more than one hour after the end of the previous shift which used the gases
2) hoses and cylinder keys are removed from the gas cylinders (and kept close to hand)
3) valves are fully closed
4) all cylinders are properly supported and secured in the vertical position
5) hoses are coiled and placed to ensure that they are protected from damage
6) the Client is advised and approval obtained.

A sign at the LFEPA rendezvous point shall announce that gas is being used, the type of gas, and that the same notice is given to the Customer Service Supervisor/ Manager. .

Suppliers shall remove gas cylinders when the public has access to the station.

Additionally, Suppliers shall not take gas cylinders onto the station in Traffic Hours.

42.6.2 Storage of gas cylinders (above ground)

The Supplier shall:

1) only store gas cylinders at ground level in a locations approved by the Client and in accordance with clause 42 'Storage'
2) not store them in a position that will cause an obstruction to passageways, passenger areas, ticket offices or staff accommodation, or be near any source of ignition
3) ensure that cylinders are stored in locked cages, kept vertical and properly fixed and supported
4) ensure that all hoses and cylinder keys are removed from cylinders and kept close to hand
5) use cylinder trolleys for all movements of gas cylinders and all cylinders shall be secured to the cylinder trolley by either a suitable chain or strap
6) provide signage at the entrance of premises when gas cylinders are being stored.

42.7 Flammable and highly flammable materials

42.7.1 Use of flammable and highly flammable materials below ground

Suppliers shall provide adequate ventilation if the Supplier's use of flammable substances and volatile materials creates any risk of heavy vapours in confined spaces and take other environmental issues into consideration.
Where flammable or highly flammable materials are required to be used below ground the Supplier shall ensure that approval is sought from the Client in line with LU Manual of Good practice G085 'Code of practice - Fire Safety of Materials and Fire Safety of Specific Items and Materials' and a method statement is included with the application.

42.7.2 Storage of flammable and highly flammable materials below ground

Flammable and highly flammable materials may be stored on LU Premises with permission, in limited quantities, in suitable sealed containers (as appropriate) or purpose built stores, or in portable storage bins in areas covered by sprinkler systems, or temporary stores controlled by storage licence. The following maximum quantities are allowed below ground:

1) highly flammable: Flashpoint between 0°C and 21°C - 1 litre in 0.5 litre containers
2) flammable: Flashpoint between 21°C and 55°C - 69 litres in 25 litre containers.

Where the Supplier has to use such materials, and has approval to use them, it shall only use the minimum quantities needed to carry out the works satisfactorily.

43 Hot work and fire hazards

43.1 Hot work

Hot work shall be carried out as set out in the Rule Book support document 'Hot working'.

43.2 Reasonable notice of works

Suppliers shall submit applications for permits for hot working at least one week before the intended start date. This period of notice shall extend to two weeks where the isolation of fire detection or prevention equipment or exemptions is required.

In an emergency a lesser period of notice may be given provided that a contingency method statement has been approved by the LU or Tube Lines Fire Safety Manager to cover such eventualities.

43.3 Precautions

43.3.1 Buildings and Assets

The Supplier shall protect the fabric of the building, its assets and decorations with suitable non-combustible material and take every precaution to prevent damage by scorching or fire.

43.3.2 Gas cylinders

Hoses connected to gas cylinders shall be of the braided or armoured type to prevent damage and risk of gas leakage.

43.3.3 Gas detection

At work sites in below ground locations the Supplier shall provide and use suitable gas detection equipment in order to detect the possible presence of flammable gases prior to (and during) any hot work or other fire hazardous operation.

44 Storage

44.1 General requirements for storage

No Supplier or person shall store materials on LU Premises without the appropriate licence. A licence is obtainable through the Client representative. Information on applying and holding a storage licence are set out in Rule Book support document 'Applying for a storage licence'.

Suppliers shall:

1) ensure that all their storage locations are licensed in accordance with Rule Book Support Document 'Applying for a storage licence'

2) prominently display such licenses

3) not store any material in a position where it could fall, slip, roll or be blown onto the track, railway equipment, public highway, platforms or walkways

4) when storing cable drums on platforms Suppliers shall secure them with a chain and padlock within a hoarded area

5) carry out a thorough safety inspection at the end of each shift and after use of the storage area to ensure that stored items are secure and compliant with the conditions of the storage licence

6) comply with all legislation and relevant Environment Agency guidance notes in respect to oil, liquid and other potential pollutant storage

7) store liquids in enclosures or trays to contain any spills or drips

8) protect and store materials in such a way as to minimise unnecessary damage, wastage, spoiling of goods or environmental harm.

44.2 Trackside storage

Suppliers shall comply with LU standard S1158 'Track - Inspection and Maintenance' which sets out LU's requirements for trackside storage.

44.3 Hazardous materials and substances

Suppliers shall not store any hazardous materials on stations except where allowed under the terms of a storage licence, in the quantities and containers specified, with a current storage licence and in conditions and locations specified under that licence. See also clauses 42.6.2 'Storage of gas cylinders (above ground) and 40.7.2 'Storage of flammable and highly flammable materials below ground'.

44.4 Allocation of space on operational property

Storage may not be possible where storage has already been utilised by another Supplier. The requirements and process for obtaining space allocation is set out in LU standard S1472 'Allocation of space on operational property'.

45 Plant and equipment

Suppliers shall ensure all plant and equipment intended to be used or stored on LU Infrastructure has the appropriate plant approval in accordance with standard S1171 "All Plant – Acceptance, Use and Maintenance", unless it falls into the exclusions described in Standard S1171. The engineering requirements for specific types of plant and the requirement for verification of conformity with these engineering requirements are set out in the other three Plant Standards as follows:

- S1172 – On-Track Machines
- S1173 – On-Track Plant
- S1174 – Non-Railborne Plant

Suppliers shall comply with LU Standards S1023 'Infrastructure Protection' and S1050 'Civil Engineering - Common Requirements'.

Suppliers shall comply with cutting, grinding, drilling, fixing to and supporting from existing structures requirements in section 3.10 of LU Standard S1050 'Civil Engineering - Common Requirements'. Guidance on cutting, grinding, drilling, fixing to and supporting from existing structures is also contained in LU Manual of Good Practice G050 'Civil Engineering - Common Requirements'.

46 Clearance approvals

No structure (temporary or permanent), plant, equipment or materials may be erected or stored within 3 metres of a running rail without first obtaining formal clearance approval.

The sole exception to this requirement is where the items concerned are only in place or use during Engineering Hours or a possession with adequate protection, which ensures that no trains or engineer's vehicles will run on the track adjacent to those items.

47 Access equipment

Where access equipment is being used on LU Premises, Suppliers shall gain prior approval from the relevant LU operational manager.

Suppliers shall state in their method statements what access equipment shall be used in the work package.

Suppliers shall also:

1) obtain approval from the Client prior to the erection of any scaffold
2) not use scaffolding of any type adjacent to Network Rail's infrastructure;
3) ensure that scaffold adjacent to track and remaining in place during Traffic Hours is subject to LU Standard S1156 'Gauging and Clearances'
4) provide an assessment of any bearing materials or structure in accordance with LU Standard S1050 'Civil Engineering - Common Requirements'
5) ensure that trestles and scaffold do not rest directly on the track ballast, unless adequate tying is provided to prevent overturning
6) insulate equipment from the low voltage that may be generated for signals and maintenance unless the Client directs otherwise
7) only store fibreglass ladders which meet the requirements of LU Manual of Good Practice G-085 'Fire safety of materials and fire safety of specific items and materials used on the Underground'
8) clearly label all ladders to show that they are LU compliant and
9) ensure that they are aware of LU structures which are restricted to 'pedestrian loading'.

48 Temporary works

All temporary works shall comply with the requirements set out in the LU standard S1062 Temporary works. Suppliers shall:

1) provide, maintain and remove on completion of the Contract all temporary works needed for the execution of the Contract
2) submit detailed design drawings, calculations and specifications for all temporary works to the Client for acceptance
3) ensure that designs are submitted at such times agreed with the Client
4) design all temporary structures to carry the loads they are required to support
5) modify the detailed design drawings, calculations and specifications for temporary works if required by the Client
6) note that acceptance by the Client of the detailed drawings of temporary structures in no way relieves the Supplier of any responsibility under the Contract
7) the duration of the work shall be agreed with the Client.

49 Temporary fences and hoardings

All site hoarding, fencing and barriers shall comply with the requirements in Standard S1027 Site Hoarding, Fencing and Barriers.

50 Temporary lighting and power suppliers

50.1 General requirements

The Supplier shall obtain approval from the Client for the design of lighting or other electrical installations where it is proposed to use LU's power supply. This is to allow the Client to check that the lighting will not cause any problems. The use of generators shall be approved by the Client.

50.2 Lighting in tunnels and shafts

The minimum standard for temporary lighting in tunnels and shafts is set out in LU standard S1066 'Lighting of London Underground Assets'.

51 Screening of lights and positioning

All lights or lasers provided by the Supplier shall be placed or screened so as not to cause any confusion with or interference with any signal lights on the railway or on any other railway or signal lights of any local or other authority. If directed, the Supplier shall take appropriate action, and replace them in positions approved by the Client. This approval shall not preclude the Client giving further directions about the replaced lights or lasers.

Temporary lighting festoons shall have cages around bulbs and if in exterior locations shall have correct IP rating.

Lights shall be angled and controlled so as to not interfere with adjacent properties and to minimise glow in the sky in line with LU standard S1066' Lighting of London Underground Assets'.

52 Environmental requirements

52.1 General environmental requirements

Suppliers shall:

1) use good industry practice to minimise the environmental impact of all activities

2) apply for all permits, agreements, consents and licences as required and abide by conditions within the permits, agreements, consents and licences. No work shall commence until all permits, agreements, consents and licences are obtained (refer to potential exception in Section 53 'Waste management'). A copy of the licences, agreements, consents and permits shall be made available to the Client upon request

3) in the event of a breach of permit, agreement, consent or licence conditions the Supplier's representative and regulatory body/bodies will be informed in accordance with Section 26 'Monitoring'

4) exercise a duty of care and be liable for all claims, costs, expenses incurred directly or indirectly by any party as a result of any breaches of the applicable environmental laws

5) employ competent Suppliers with proven environmental performance.

Site Investigations

1) ensure they are aware of all environmental conditions and hazards on site

2) undertake investigations and evaluations at such a stage in the project that the implications of any findings can be incorporated into the design, program of works and method statements as necessary.

Mitigation and Process

1) appropriately mitigate impacts from the scheme on the environment

2) submit to the Client and adhere to arrangements and/or method statements which outline and demonstrate how the supplier will manage environmental performance and impact;

3) notify the Client immediately of any changes to method statements or environmental arrangements which result in significant changes to the environmental risk profile.

Reporting

1) monitor and report on environmental performance in line with LU standard 1-566 'Monitoring Health, Safety and Environmental Performance' and

2) make available to LU/Tube Lines upon request the results of any monitoring undertaken.

Suppliers shall record environmental incidents such as spillages, disturbance of invasive/protected species etc. through an appropriate incident reporting system.

52.2 Environmental nuisance

Suppliers shall:

1) ensure that best practical means are followed to control nuisances to LU, its customers and neighbours, derived from noise, smells, fumes, dust, smoke, light, vibration, air pollution, overspray from herbicides or pesticides, congestion and parking associated with the works

2) inform neighbours of potential nuisances prior to commencing specific projects or major project works as agreed with the Client and

3) establish a suitable system for dealing with customer queries and complaints that comply with LU requirements. Suppliers shall contact complainants within ten days or as agreed otherwise with the Client.

52.3 Water

Suppliers shall:

1) assess whether the site has the potential to suffer from water ingress. This shall include as a result of weather conditions, tidal conditions, and rising groundwater and ensure that mitigation measures are in place based upon the risk of water ingress

2) identify where waterways, drains, springs, wetland habitats or water supplies may be intercepted, interfered with or cut through by the works, and outline in method statements and/or environmental arrangements suitable mitigation measures and actions to ensure functionality of these watercourses is not impeded. This shall include any requirements to notify, or receive permission from regulatory authorities or other bodies

3) take all necessary precautions to prevent water being discharged from the site from entering the works of adjacent contracts or adjacent properties

4) not make temporary or permanent connections to any water supply mains or wastewater networks without informing and receiving the necessary permission from the relevant authority

5) be responsible for any necessary actions for the training, diverting, or conducting of open streams or drains intercepted by the works

6) provide suitable measures to prevent water contamination from suspended solids, hydrocarbons etc.

7) provide, where necessary, temporary water courses, floodwalls, ditches, drains, pump sumps, pumping or other means that may be necessary to maintain the works free of water and record proposals and

8) consider options for managing and reducing water use in accordance with LU Standard 1-068 ‘Station Mechanical Services, Utility Provision & Energy Management’.

52.4 Waste management

Suppliers shall:

1) be responsible for all waste materials generated by the works, as agreed by the Client (except where otherwise specified in the Contract); and
2) undertake their responsibilities under the Site Waste Management Regulations 2008 as required by legislation.

52.5 Noise and vibration

Suppliers shall:

1) undertake the necessary investigation to establish whether or not the construction works or the project deliverables have the potential to produce significant noise impacts in relation to the sensitivity of surrounding and working areas. This investigation shall include:
2) liaison with the Client
3) an identification of the activities likely to produce levels of noise and vibration that exceed those set in British Standards and
4) an outline of any requirements to monitor noise and vibration levels during construction works required in respect to minimising damage to buildings and minimising complaints
5) use a competent person to assess the work that is to be carried out to determine whether or not an application under Section 61 of the Control of Pollution Act 1974 is required
6) where necessary, make an application under Section 61 of the Control of Pollution Act 1974 and work to the conditions therein. Where practical, work shall not commence until applications made under Section 61 have been granted, unless agreed with the Client
7) notify the Client of any changes, dispensations or variations being sought in respect to a Section 61 application and
8) ensure that the environmental arrangements and/or method statements outline and demonstrate how noise and vibration will be managed for the project including:
    - identification of noisy activities
    - duration of operating hours for individual activities
    - mitigation measures to be employed to reduce noise and vibration levels and to minimise disturbance
    - details of any proposed noise and vibration monitoring programmes and
    - details of plant type, location and noise control methods.

52.6 Archaeology, historical interest and listed buildings

Suppliers shall:

1) undertake the necessary investigations to establish what archaeological, historical or listed features are in the affected area and whether or not the works have the potential to damage or affect these areas including interior features and any effects in respect of the character of such premises and shall include liaison with the Client and
2) suspend all activities on the discovery of archaeological finds until the Client has been contacted and suitable measures have been taken to prevent damage to the remains unless the works are of a safety critical nature.

52.7 Wildlife and Habitats

Suppliers shall:

1) undertake assessments to establish whether tree protection orders, conservation areas, sites of importance to nature conservation, protected species, pest species etc. are present at the works location
2) organise and programme construction activities to ensure that the impacts on any protected species or habitat are minimised in line with legislative or regulatory requirements
3) preserve and protect all trees and plant species (excluding noxious or invasive species) where possible within the scope of the work
4) not lop, fell, damage or cut roots of trees with Tree Protection Orders unless the safety of the railway is impeded or a permit has been obtained from the local authority
5) replace any trees which are permitted to be cut down or are damaged by the supplier as part of the reinstatement works in accordance with British Standards and with consideration for the local environment and biodiversity
6) minimise damage to mature trees within or in the vicinity of work sites by adopting the mitigation measures outlined in the environmental arrangements and/or method statements
7) apply to the Local Authority or private owner to remove or trim any tree part located off the work site where practical and
8) retain tree brashing and tree waste (non pest species only) on site for use as much wherever possible, appropriate and safe to do so.

52.8 Resource Use

Suppliers shall:

1) ensure that all systems which use electricity or gas are designed to conserve energy in accordance with LU Standard S1068 'Station Mechanical Services, Utility Provision and Energy Management' and

2) Consider the potential for using recycled materials and recycling resources/materials.

52.9 Pest control

Suppliers shall:

1) outline arrangements for how any noxious and invasive plants identified will be managed in accordance with industry Codes of Practice and LU standard S1165 'Landscaping and Vegetation'
2) submit details of the pesticide and herbicide type(s) to be used, outline the proposed quantities and detail the application methods and
3) adequate provision shall be made so as to avoid the migration of pests from site and to mitigate against any other pest nuisance at the site.

52.10 Land and Water Pollution Prevention

Suppliers shall:

1) ensure that land or water pollution is prevented through managing all potential pollutants in accordance with Clause 42.1 'General requirements for storage' and
2) in the event of causing land or water pollution, return the site to the condition it was prior to contamination or better.

53 Quality requirements

53.1 Records

The Supplier shall maintain such records that are specified by the Client, and this shall include as a minimum:

1) details of any non-compliance against any LU Standard
2) records of audits and site inspections
3) records of the qualifications, competence and training of staff
4) quality assurance inspections conducted (including the identity of the inspector concerned)
5) equipment test calibration and verification checks conducted (including the identity of the inspector or tester concerned)
6) process and manufacturing data relating to the Contract, including an audit trail for material or component identity, source and status
7) any process, inspection or test activity so directed by special instructions or any Contract Quality Plan invoked by the Contract
8) non-conforming service or product records
9) records of all related incoming and outgoing certificates of conformity and associated release documentation

10) records of tender and contract reviews

11) the Supplier's policy with regard to quality.

53.2 Retention period

Records shall be retained by the Supplier for a minimum of seven years unless otherwise specified by the Client at contract award.

53.3 Availability of records for inspection

The Supplier shall make all such records available to LU and the Client within three working days of any such request.

53.4 Statistical process control, audit and inspection procedures

Where, for quality management purposes, statistical process control procedures, audit or inspection procedures are adopted, full details of the proposed procedures used on the Contract are to be submitted to the Client for approval prior to implementation.

53.5 General quality requirements

Suppliers shall:

1) appoint member(s) of their management team who, irrespective of other responsibilities, have defined authority that includes:
   a) ensuring that a quality management system is implemented and maintained
   b) reporting to senior management on the performance of the quality management system, including needs for improvement
   c) ensuring awareness of customer requirements throughout the Supplier's organisation
   d) liaison with customers on matters relating to the Supplier's management system that result from auditing or non conformances.
2) ensure that during internal processing and final delivery of product or service to the intended destination that the identification, packaging, storage, preservation and handling do not affect conformity with product or service requirements
3) not proceed past 'hold points' until all the specified activities have been satisfactorily completed and the related documentation is available and authorised
4) following receipt of a rejection, take immediate action to inspect all stocks and work in order to assess risk and loss and advise the Client of the findings
5) take preventative action to avoid a recurrence of the non conformities

6) immediately inform the Client when the Supplier has reason to suspect non conformities with previously supplied products or services

7) be responsible for ascertaining the cause of and responsibility for non conformance, and for taking suitable corrective action to prevent their recurrence

8) document all corrective actions

9) ensure that their supply chain work to correct practices including accepted documentation defining the techniques to be used, workmanship criteria, safety of others (including the public), health precautions, plant and equipment to be used and training and licensing requirements

10) ensure that the works comply with any manufacturer's recommendations, instructions and guidelines, unless otherwise directed by the Client

11) operate and maintain all plant, equipment and processes in accordance with the relevant manufacturer's or Supplier's specification or procedure, unless otherwise directed by the Client

12) take all necessary steps to identify, recall, re-inspect and replace any equipment or parts which have been inspected using inspection, measuring or test equipment whose calibration is found to be defective or unknown

13) store and protect inspection, measuring and test equipment and materials to prevent misuse, damage and deterioration and

14) ensure that all equipment bears an identification of its calibration or maintenance status, in a manner that clearly indicates it is within the calibration or maintenance period.

53.6 Quality Plan

The Supplier shall:

1) complete and submit a Quality Plan with the tender if required by the Client for review and acceptance

2) ensure that the Quality Plan demonstrates the Supplier's process control system as required for the Contract and

3) maintain and periodically revise the Quality Plan and forward it in its amended form to the Client.

The format of the Quality Plan may be determined by the Client. The Quality Plan shall be developed in line with BS ISO 10005:2005.

53.7 Testing and inspection

When required by the Client Suppliers shall:

1) demonstrate to the Client’s satisfaction that acceptance sampling techniques are utilised and such sampling shall meet the requirements of BS 6001-1:1999/ISO2858: 1999; BS6001-2:1993/ISO2859:1985; BS6001-3: 2005 and

BS6001-4:2005/ISO2859-5: 2005 ‘Sampling procedure for inspection by attributes’

2) identify which sampling plan it intends to apply to the Contract and forward it to the Client for approval

3) reference the sampling once it has been approved in all relevant Contract Quality Plans submitted to the Client

4) be prepared to revert to 100% inspection in such cases where the failure rate exceeds the level of acceptance identified within the sampling plan

5) prepare for the approval of the Client an inspection and test plan which shall include such hold points agreed with the Client

6) maintain sampling inspection records in accordance with the Client’s requirements.

53.8 Certification of conformity

Suppliers shall:

1) provide (for the Client) certificates of conformity for services and products that include:

   a) Supplier's name and location address

   b) Supplier's full company name and manufacturing address, if different to above

   c) employer’s supplier rating system number

   d) unique certificate reference number and date of certificate

   e) details of valid third party approvals, applicable to the services or products provided and the establishment providing the services or products to the Client

   f) the Client’s contract reference and, if applicable, quality plan number

   g) full description and quantity of supplies, including specification, drawing number and issue numbers and British, EC or relevant standards applicable

   h) identification marks and serial numbers as appropriate

   i) details of authorised non conformities, Client concession or production permit references and a full statement of authorised deviations, operations or processes not conducted

   j) for all materials (raw or finished):

      i. cast and/or batch number(s)

      ii. test report reference and, if called for, copies of test results and additionally for metallic materials

      iii. the condition of the material despatched

iv. recommended heat treatment if the material is being delivered not in a final use condition

v. chemical analysis and/or mechanical testing certificates

vi. inspection stamp and/or authorising signature

vii. details of packaging and transportation where appropriate

viii. country of origin (EC requirement)

2) ensure that all certificates include one of the following statements of conformity signed by an authorised signatory, on behalf of the Supplier:

a) for supplies from a manufacturer, the format shall be ‘Certified that the whole of the supplies detailed hereon have been inspected and tested, and (unless otherwise stated) conform in all respects with the requirements of the Contract’

b) for supplies from an agent, stockist or distributor (i.e. where the Supplier is not the manufacturer) the format shall be ‘Certified that the whole of the supplies detailed hereon have been inspected and tested and (unless otherwise stated) conform in all respects with the requirements of the Contract’

c) for services the format shall be ‘Certified that the services detailed hereon have been inspected and tested, and (unless otherwise stated) conform in all respects with the requirements of the Contract’.

3) provide a copy of the Supplier's authorised signatory list, showing as a minimum, name, job title, signature, designated authority level at the commencement of the Contract

4) ensure that any certification from sub-contractors for parts or services related to the Contract accompanies the Supplier's certificate of conformity

5) agree with the Client a certificate of conformance for use where projects or part projects are handed over

6) include in the certificate of conformance a 'Statement of design performance’ where design work is provided

7) provide statutory test certificates where applicable.

53.9 Quarantine

Suppliers shall provide secure quarantine storage for the storage of materials and products that are the subject of investigation regarding their conformance, or non-conformance.

53.10 Traceability

The Supplier shall ensure that all the materials to be incorporated into works delivered to site are controlled at installation and are able to be traced to manufacturer, unless indicated otherwise by the Client.

53.11 Maintenance and servicing

Suppliers that maintain or service LU assets shall provide the Client with written details of how their arrangements for maintenance and servicing will ensure the reliability, maintainability, durability and serviceability of the asset.

53.12 Design

No person shall change the design of any engineering or training system for the installation, operation and maintenance of infrastructure equipment without complying with LU standard S1538 'Assurance'.

Suppliers shall:

1) operate a change control system so that the appropriate issue of drawings, technical specifications, training material and current deviations and concessions including customer supplied standards can be readily determined at all times
2) ensure that all design changes and modifications are identified, documented, reviewed and approved by authorised personnel before their implementation
3) record the results of all design assessments and hand over such records to the Client
4) appoint or nominate a design authority for each design
5) ensure that designers hold BS-EN-ISO-9001 certification relevant to the scope of work or, if the design Supplier is not certificated to BS-EN-ISO 9001, a documented management system which includes design shall be required, which would satisfy the requirements of the standard.

53.13 Computer aided design

Suppliers shall provide computer aided designs in a style, format and software specified by the Client.

53.14 Asset commissioning and handover

No project shall be considered complete unless the Client is in possession of the information deliverables specified in contract documents. Using the additional contract document requirement list is optional (see attachment 2). Documents may be identified in other parts or sections of a particular contract.

54 Additional information

54.1 Supporting information – QUENSH Contract Menu

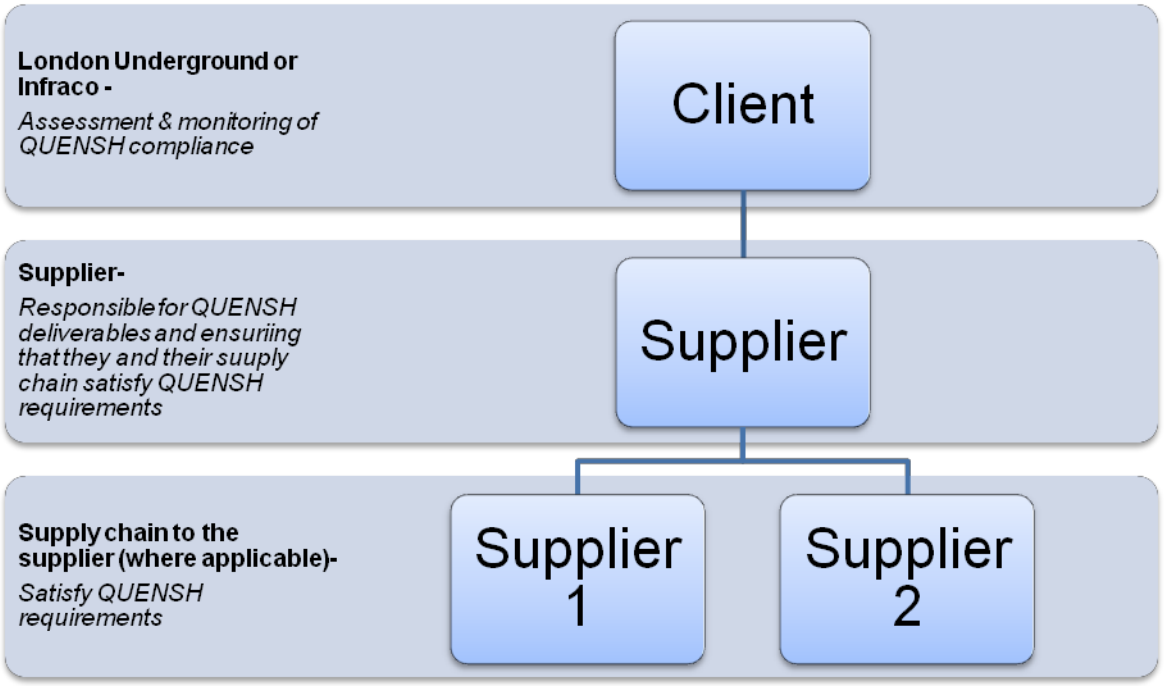
The Contract Menu (form **F0780**) can be found in the Management System library.

54.2 Attachment 1: QUENSH duty holder relationship

The LU QUENSH Contact Conditions place responsibilities on two distinct parties:

- the Client;
- the Supplier;

The diagram below explains how information shall flow between each party and outlines their primary responsibilities as defined by the QUENSH Contract Conditions.



54.3 Attachment 2: Additional contract document requirement list

Contract QUENSH Conditions

Additional contract document requirements list

Contract no: _____

Contract title: _____

Supplier: _____

Instructions

1. The Supplier shall ensure the initiation, production, review, approval and timely submission and update of the documents highlighted in the attached list and as subsequently advised by the Client.
2. Documents shall be in the format, size and quantity specified unless otherwise agreed with the Client.
3. Documents highlighted (Y / N) for inclusion in Contract Data Dossiers shall be collated, compiled, indexed and filed into Contract Data Dossiers ready for submission at completion of works in accordance with this list.
4. Refer to the following key for clarification:

   Format

   i) HC Hard Copy

   ii) HCLB Hard Copy (laminated and bound)

   iii) MDC Magnetic Disk Copy (3.5” diskette)

   iv) CD CD-ROM
5. All documents, drawings, sketches and certificates shall be sent direct to the Client under cover of an approved document transmittal note.
6. Laminated and bound copies will only be required at document handover stage. Hard copy of all interim drawings, sketches, etc. is acceptable.
7. All documents laminated and bound for handover purposes will require an unbound duplicate for copying purposes.
8. All documents shall contain, as a minimum, the following information:

   i) unique number;

   ii) title;

   iii) revision number;

   iv) page number, document number, and revision number on every page;

   v) authorisation signatures where appropriate.

Prepared by: _____ Signature: _____

Position: _____ Date: _____

Approved by: _____ Signature: _____

Position: _____ Date: _____

DESCRIPTIONS	Document No: Revision: Date:	REQUIREMENTS					Page of	
GENERIC TYPE	**CATEGORY**	**REQUIRED (Y / N)**	**NO.**	**FORMAT**	**SIZE**	**SUBMISSION SCHEDULING**	**INCLUSION ALSO IN DATA DOSSIERS (Y / N)**	**NOTES**
1. SPECIFICATIONS	1.1 DESIGN-PRELIMINARY/FINAL	N						
	1.2 MATERIALS/EQUIPMENT	Y						
	1.3 PRODUCTION	Y						
	1.4 DESPATCH	Y						
	1.5 METHOD STATEMENT	Y						
	1.6 INSPECTION & TEST	Y						
	1.7 COMMISSIONING	N						
	1.8 MAINTENANCE	Y						
2. DRAWINGS	2.1 CONCEPTUAL DESIGN	N						
	2.2 GENERAL ARRANGEMENTS ELECTRICAL & MECHANICAL	N						
	2.3 SUB-ASSEMBLY	Y						
	2.4 DETAIL/COMPONENT PARTS/ SUB-ASSEMBLY AS BUILT	**N**						
	2.5 INTERFACES	N						
	2.6 BUILDERS WORKS	N						
	2.7 LOCATION PLANS	N						
	2.8 SCHEMATICS	N						
	2.9 ELECTRICAL DATA	N						

DESCRIPTIONS	Document No: Revision: Date:	REQUIREMENTS					Page of	
GENERIC TYPE	**CATEGORY**	**REQUIRED (Y / N)**	**NO.**	**FORMAT**	**SIZE**	**SUBMISSION SCHEDULING**	**INCLUSION ALSO IN DATA DOSSIERS (Y / N)**	**NOTES**
3. CALCULATIONS	3.1 DESIGN	N						
4. WORK INSTRUCTIONS MANUAL	4.1 PRODUCTION/ASSEMBLY/ SERVICING	N						
	4.2 DESPATCH	N						
	4.3 INSTALLATION METHOD STATEMENTS	N						
	4.4 INSPECTION & TEST METHOD STATEMENT	N						
	4.5 COMMISSIONING	N						
	4.6 OPERATION	N						
	4.7 MAINTENANCE	Y						
5. CERTIFICATION/ VALIDATION	5.1 MATERIAL	Y						
	5.2 SOFTWARE SOURCE CODE TEXT SCRIPT INTEGRATION TESTING DOCUMENTATION	N						
	5.3 INSPECTION, MEASUREMENT & TEST EQUIPMENT/ CALIBRATION	Y						
	5.4 INSPECTION & TEST RESULTS	Y						
	5.5 TRAINING PLAN/ DOCUMENTATION	Y						
	5.6 APPROVED AUTHORITY AND SIGNATORY LIST	Y						
	5.7 COMMISSIONING	N						

DESCRIPTIONS	Document No: Revision: Date:	REQUIREMENTS					Page of	
GENERIC TYPE	**CATEGORY**	**REQUIRED (Y / N)**	**NO.**	**FORMAT**	**SIZE**	**SUBMISSION SCHEDULING**	**INCLUSION ALSO IN DATA DOSSIERS (Y / N)**	**NOTES**
6. QUALITY	6.1 QUALITY MANUAL	Y						
	6.2 QUALITY PLAN	Y						
	6.3 AUDIT REPORTS	Y						
	6.4 AUDIT SCHEDULE	Y						
	6.5 APPLICATION FOR CONCESSION	Y						
	6.6 CERTIFICATES OF CONFORMITY	Y						
	6.7 PRESSURE VESSEL TEST CERTIFICATE	Y						
	6.8 INSPECTION, TESTS, MEASUREMENT PLAN	Y						
	6.9 SAMPLING INSPECTION PLAN	Y						
7. OTHERS	7.1 TECHNICAL QUERY	Y						
	7.2 CONTRACT SUBMISSIONS LOG	Y						
	7.3 SCHEDULE OF SUB-CONTRACTORS/SUPPLIERS	Y						
	7.4 CONTRACT DATA DOSSIERS	Y						
	7.5 DELIVERY PROGRAMME	Y						

55 References

55.1 References

55.1.1 Statutory documents

Document no.	Title
	Transport and Works Act 1992
	Control of Pollution Act 1974 - Section 61

55.1.2 British Standards

Document no.	Title
BS ISO 10005:2005	Quality management systems. Guidelines for quality plans
BS 6001-1:1999	Sampling procedures for inspection by attributes. Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection
BS 6001-2:1993, ISO 2859-2:1985	Sampling procedures for inspection by attributes. Specification for sampling plans indexed by limiting quality (LQ) for isolated lot inspection
BS6001-3: 2005	Sampling procedures for inspection by attributes. Specification for skip-lot sampling procedures
BS 6001-4:2005, ISO 2859-5:2005	Sampling procedures for inspection by attributes. System of sequential sampling plans indexed by acceptance quality limit (AQL) for lot-by-lot inspection
BS EN ISO 9001:2008	Quality Management System

55.1.3 LU company documents

Document no.	Title
S1548	Safety Critical Work
S1483	High visibility clothing for going on or near the track
S1251	Alcohol and work
S1257	Drugs and work
S1538	Assurance
S1556	Incident Reporting and Investigation
S1193	Electromagnetic Compatibility (EMC) with LU Signalling System Assets
S1158	Track - Inspection and Maintenance
S1092	Escalator and passenger conveyors’
S1093	Lifts including Firefighter and Evacuation Lifts
S1085	Fire safety performance of materials
G085	Manual of Good Practice Fire Safety of Materials and Fire Safety of Specific Items and Materials Used in the

Document no.	Title
	Underground
S1472	Allocation of space on operational property
S1023	Infrastructure Protection
S1050	Civil Engineering - Common Requirements
G050	Manual of Good Practice - Civil Engineering - Common Requirements
S1156	Gauging and Clearances
S1027	Site Hoarding, Fencing and Barriers
S1066	Lighting of London Underground Assets
S1068	Station Mechanical Services, Utility Provision & Energy Management
S1165	Landscaping and Vegetation
S1062	Temporary works

55.1.4 Other

Document no.	Title
Rule Book 9	Lifts, escalators and moving walkways
Rule Book 10	Station Access
Rule Book 14	Possession planning and management
Rule Book 15	Possession protection methods
Rule Book 16	Going on the track in Engineering Hours
Rule Book 20	Engineering staff - Traffic Hours protection
Rule Book 21	Personal safety on the track

55.2 Abbreviations

The following topic-specific definitions are created:

a. within London Underground's Glossary of Terms (a Category 1 Standard S1622)

b. from published sources that are clearly identified.

Abbreviation	Definition	Source
AFFF	Aqueous Film Forming Foam	a
ALARP	As Low As Reasonably Practicable	a
ARF	Access Request Form	a
CIRAS	Confidential Incident Reporting and Analysis System	a
DAMSP	Drugs Alcohol Medical Screening Programme	a
FRC	Fault Reporting Centre	a
HSE	Health and Safety Executive	a
HV	High Voltage	a
ITT	Invitation to Tender	a

Abbreviation	Definition	Source
LFEPA	London Fire and Emergency Planning Authority	a
LU	London Underground	a
PFI	Private Finance Initiative	a
PICER	Person in Charge Evacuation Register	a
PPE	Personal Protective Equipment	a
PPP	Public Private Partnership	a
QUENSH	Quality, Environment, Safety, Health	a
SABRE	Site Access Booking for Railway Engineering	a
SQE	Safety, Quality and Environment	a
SWP	Station Works Plan	a
TAC	Track Access Controller	a

55.3 Definitions

The following topic-specific definitions are created:

a. within London Underground's Glossary of Terms (a Category 1 Standard S1622)

b. from published sources that are clearly identified.

Term	Definition	Source
Client	For QUENSH, the party procuring goods, services or works - London Underground	a
Closure	Any planned disruptive works which result in those Facilities which are required under Schedule 2.1 (Service Outputs) of the PPP Contracts not being Available in accordance with the Access Code which is either a Major Closure, a Minor Closure, a CTRL Closure or an L&E Closure	a
Customer Service Supervisor/ Manager	A member of LU operating staff normally in charge of the operation of a station or a group of stations.	a
Emergency Plan	A document setting out a planned and co-ordinated response to a sudden hazardous occurrence or danger, which requires immediate action.	a

Term	Definition	Source
Engineering Hours	Is the period of time between • the published time, or actual time if later, traction current is switched off and • the published time, or amended time if earlier, traction current is switched on. Engineering hours cannot be extended.	a
General Access (Request)	A request for access by an Access Party on behalf of itself or other third parties to such parts of the LU Network for the performance of repetitive, routine and non-disruptive activities on the LU Network during Traffic Hours and/or Engineering Hours.	a
LU Operational Property	All land and structures within the boundary of the railway including track, sidings, depots, car parks, forecourts and maintenance facilities, bridges and any other structures forming part of the railway undertaking	a
LU Premises	The operational railway including signal cabins, depots and sidings.	a
Operational Assurance	The process by which Area Managers or Train Operations Managers acknowledge that they are able to safely operate the station or train service during and/or following any proposed works.	a
Possession	A designated section of track where a Possession Master has control. Unauthorised train movements into the section are prevented by the arrangements shown in the possessions standards.	a
Possession Master	A person certificated by LU to take control and give up a possession, in order to carry out engineering and similar work.	a
Protecting Workers on the Track	A person certificated by LU to safely manage worksites and provide protection for themselves and others in engineering hours, traffic hours, depots and possession worksites. The Protecting Workers on the Track certificate will be endorsed with the relevant activity.	a
Protection	Procedures to make sure the staff on the track are not endangered by a moving train or mechanised vehicle.	a

Term	Definition	Source
Protection Master	A person certificated by LU to provide protection for himself and others on or about the track during: traffic hours, engineering hours. The Protection Master's certificate will be endorsed to show traffic hours or engineering hours or both.	a
Safety Critical Activities	Activities which, if they are undertaken incorrectly, have the potential to increase overall risk on or about the business.	a
Section 12 Station	Section 12 Station means a Station to which The Fire Precautions (Sub-Surface Railway Stations) Regulations 1989 or any other relevant regulations made under section 12 of the Fire Precautions Act 1971 apply.	a
Site Access Booking for Railway Engineering (SABRE)	A computer system that is used to book, clash check and approve all planned work to be carried out on the London Underground network. The system generates a unique 7-digit number. An approved SABRE Number is evidence that the planned work has LU or Tube Lines approval and is compatible with any other works on the site.	a
Site Person in Charge	The designated person on site (both on and off the track) accountable for: the work in progress; discipline; programme of work; plant; materials; general health and safety. The Site Person in Charge - Safety on the Track's certificate will be endorsed to show traffic hours, engineering hours or depots, or any combination of these.	a
Sub-contractor	Parties appointed by a Supplier.	a
Supplier	For QUENSH, the primary organisation or individual that is selected to deliver a product, service or facility to the Client. This may include consultants, contractors and PFI Contractors and excludes organisations or individuals selected by and contracting directly to them.	a
Track Access Controller	A person licensed by LU to control the Line Clear and Line Safe Procedures.	a
Traffic Hours	The period between the published time or: amended time, if earlier, traction current is switched on and actual time, if later, traction current is switched off.	a

Term	Definition	Source
Protecting Workers on the Track	A person certificated by LU to safely manage worksites and provide protection for themselves and others in engineering hours, traffic hours, depots and possession worksites. The Protecting Workers on the Track certificate will be endorsed with the relevant activity.	

55.4 Person accountable for the document

Person accountable for the document
James Terry - Head of HS&E Capital Programmes Directorate

55.5 Document history

Edition	Date	Changes	Author
2-05104-421 R5	Sept 2003	First draft for PSC process.	MG
2-05104-421 R6	Jan 2004	Second draft for PSC process.	MG
2-05104-421 V12	Feb 2004	Approved for issue.	MG
12c	Mar 2006	References included to new Track Standards.	CB
A13 draft 2	December 2009	Review to remove duplication and inconsistencies and to remove DER role, replacing with new roles.	JJ
1-552 A13	March 2010	Approved for issue	JJ
S1552 A14	February 2013	As per DRACCT No. 01476 1-552 A13 was renumbered, reformatted and revised to incorporate Written Notices. Minor change to menu to place LU and Suppliers identification of applicable clauses side by side to enhance ease of review. No changes to requirements beyond those previously communicated in written notices.	Catherine Behan

Edition	Date	Changes	Author
S1552 A15	October 2013	Updated to reflect the changes made to the QUENSH Contract Menu F0780 as per DRACCT No. 02138. This change was to improve the layout of the current QUENSH menu, to blank out the selection of headers in order to simplify the process involved in completing the form.	Dan Eyob
S1552 A16	November 2014	Clauses 14.5, 15 and 38 revised to incorporate Written Notices. Sections 13, 14, 16-18, 20-22, 34 & 55.3 have been updated. These updates reflect the changes in protection licensing, the new access processes and remove any references to the Access Code. The Access Code will be withdrawn completely and replaced by the Access Charter Spring 2015 (1st April 2015). Clause 24 – amended to include provision for support following traumatic events as recommended by an incident investigation. Clause 42.1 and 42.2 amended to permit fire fighting arrangements to be determined by risk assessment. Clause 45 revised to include references to the relevant machine approval standards. The Quensh Contract Menu removed and stored as a separate form F0780 in the Management System library	Catherine Behan

Edition	Date	Changes	Author
S1552 A17	August 2015	- Reformatted, - revised to incorporate Written Notice (LU-WN-01313) - All temporary works shall comply with the requirements set out in LU Standard S1062 Temporary Works - Section 13 - Remove Protection workers on the track - 16.3 - Protecting workers on the track activity - Section 14.3.3 Remove various reference to Protecting workers on the track - 22.4 The heading needs to change to This need to change to" Person providing protection" - Definition - Include Protecting Workers on the Track A person certificated by LU to safely manage worksites and provide protection for themselves and others in engineering hours, traffic hours, depots and possession worksites. The Protecting Workers on the Track certificate will be endorsed with the relevant activity. - Section 44 include revised Plant standards - 35 Conveyance of loads	Erica Huntley

Edition	Date	Changes	Author
A18	November 2016	- Fit for the future(FfTF) organisational changes throughout the document, principally involving a change in the name of job title 'station supervisor' to 'customer service supervisor/manager' - Addition of new information in section 14.2 on 'Control of hours worked' - Incorporation of two Written Notices LU-WN 01380 and LU WN-0143 - Clarification to section 15.1 point 3. Change Ref. No. 05160.	Alex Ferguson

56 Current written notices attached to this document

Written Notice No	Issue date	Written Notice Title
LU-WN-01498	05/10/2017	Storage of materials and equipment in tunnel sections

Written Notice	**LU Ref. No.:** LU-WN-01498
	Suppliers Ref. No.:

1	**Written Notice Completed By**	
	Person Accountable	James Terry
	Directorate	HSE
	Date Issued	05/10/2017
2	**Details of the Standard Requiring Clarification or Correction**	
	Title:	Contract QUENSH conditions (S1552)
	Standard Reference No.	S1552
	Issue No.	A18
	Clause/Paragraph No.	Section 44.1, Point 4
3	**Details of Clarification or Correction**	
	Title of Written Notice	Storage of materials and equipment in tunnel sections
	As part of Change Proposal CR-10006, Section 44.1, Point 4 has been amended to read: When storing materials and equipment in tunnel sections, on platforms or in cross-passageways suppliers shall secure them in such a manner that they remain unaffected by wind turbulence caused by the piston effect, as trains move through tunnels.	

Schedule 6 Insurance

Insurance Table

Insurance Against	Party Responsible for ensuring insurance is in place	Minimum amount of cover or minimum limit of indemnity
Product and Public Liability Insurance All sums for which the insured shall become legally liable to pay as damages in respect of death of or injury or illness or disease to third parties and/or loss of or damage to third party property, Obstruction, loss of amenities, trespass, nuisance or any like cause happening during the period of insurance arising out of or in connection with the Contract.	**Supplier**	£5,000,000 for each and every claim or series of claims arising out of one event.
Employer's Liability Insurance Liability for death of or bodily injury or illness sustained by employees of the supplier arising out of or in the course of their employment in connection with the Contract.	**Supplier**	Not less than £10,000,000 for each and every claim or series of claims arising out of one incident.
Supplier's Materials Insurance Loss of or damage to construction plant, tools, equipment, temporary buildings (including contents therein) belonging to or the responsibility of the Supplier.	**Supplier**	The replacement cost.
Professional Indemnity Insurance Negligence omission or default in respect of the design of the Supply or other professional services for which the Supplier or its sub-contractors is responsible.	**Supplier**	£1,000,000 for each and every claim in the aggregate per annum.
Transit Insurance Transit Insurance to cover Materials, materials supplied by the Supplier until safe receipt at the Premises by the company.	**Supplier**	Not less than £25,000 for each and every claim or series of claims arising out of one incident.

Schedule 7
Deed of Novation

THIS DEED is made day of 201[ ]

BETWEEN:

LONDON UNDERGROUND LIMITED a company registered in England and Wales under number 01900907 and having its registered office at Windsor House, 42-50 Victoria Street, London SW1 0TL (the "**Company**"); and

[ ] a company registered in [England and Wales] under number [ ] and having its registered office at [ ] (the "**Supplier**"); and

[ ] a company registered in [England and Wales] under number [ ] and having its registered office at [ ] (the "**New Company**").

WHEREAS:

(A) The Company has a framework agreement dated [ ] and referenced [insert contract number] with the Supplier pursuant to which contracts may be entered into for the provision of [describe in brief the scope of supply] (together the "**Contract**").

(B) The Company wishes to transfer [part of] its benefit and burden under the Contract to the New Company.

(C) The Supplier and the New Company have agreed to such transfer upon the terms and conditions of this Deed.

IT IS AGREED AS FOLLOWS:

1. In this Deed:

1.1 "**Transfer Date**" means [ ].

2. With effect from the Transfer Date:

2.1 the New Company undertakes to perform the obligations of the Company under the Contract and be bound by its terms in every way as if the New Company is and had been named at all times as a party to the Contract in lieu of the Company;

2.2 the Supplier releases and discharges the Company from all demands and claims whatsoever in respect of the Contract and accepts the liability of the New Company in relation to the Contract in lieu of the liability of the Company and agrees to be bound by the terms of the Contract in

every way as if the New Company were and had been a party to the Contract at all times in lieu of the Company;

2.3 for the avoidance of doubt, it is hereby expressly agreed that:

2.3.1 any and all rights, claims, counter-claims, demands and other remedies of the Supplier against the Company accrued under or in connection with the Contract prior to the date hereof shall be exercisable and enforceable by the Supplier against the New Company; and

2.3.2 any and all rights, claims, counter-claims, demands and other remedies of the Company against the Supplier accrued under or in connection with the Contract prior to the date hereof shall be exercisable by the New Company against the Supplier.

2.4 the Company transfers its rights and obligations under the Contract to the New Company.

3. A person who is not a party to this Deed may not enforce any of its terms by virtue of the Contracts (Rights of Third Parties) Act 1999.

Executed as a deed by the parties and delivered on the date of this Deed

Executed as a deed by affixing the Common Seal of)

London Underground Limited)

in the presence of:-)

……..

[Authorised Signatory]

Executed as a Deed by [SUPPLIER])

acting by) ……..

) Authorised Signatory

and) .....

) Authorised Signatory

Executed as a Deed by [NEW COMPANY])

acting by) ……

) Authorised Signatory

and) .....

) Authorised Signatory

Schedule 8

Form of Parent Company Guarantee and Performance Bond

THIS GUARANTEE is made the day of 201

BETWEEN:

(1) [ ] a company registered in England and Wales under number [ ] and having its registered office at [ ] (the "**Guarantor**");

(2) [ ] a company registered in England and Wales under number [ ] and having its registered office at Windsor House, 42-50 Victoria Street, London SW1H 0TL (the "**Company**" which expression shall include its successors in title and assigns); and

(3) [ ] a company registered in England and Wales under number [ ]and having its registered office at [ ] (the "**Supplier**").

WHEREAS:

(A) This Guarantee is supplemental to a framework agreement pursuant to which contracts may be made (together the "**Contract**") for the carrying out of [ ] at [ ] made between (1) the Company and (2) the Supplier.

(B) The Guarantor has agreed to guarantee to the Company the due and punctual performance of the Contract by the Supplier in the manner hereinafter appearing.

(C) The Supplier is a party to this Guarantee in order to confirm its request that the Guarantor provide this Guarantee on the terms set out herein.

NOW IT IS HEREBY AGREED as follows:

1. The Guarantor unconditionally guarantees to the Company the proper and punctual performance and observance by the Supplier of all its obligations, warranties, duties, undertakings and responsibilities under the Contract and shall forthwith make good any default thereunder on the part of the Supplier and the Guarantor shall pay or be responsible for the payment by the Supplier to the Company of all sums of money, liabilities, awards, losses, damages, costs, charges and expenses that may be or become due and payable under or arising out of the Contract in accordance with its terms or otherwise by reason or in consequence of any such default on the part of the Supplier.

2. This Guarantee shall be a continuing guarantee and indemnity and accordingly shall remain in full force and effect until all obligations, warranties, duties and undertakings now or hereafter to be carried out or performed or observed by the Supplier under or arising out of the Contract have been duly and completely performed and observed in full.

3. The Guarantee is in addition to and not in substitution for any other security or warranty which the Company may at any time hold for the performance of any obligations, warranties, duties and

undertakings under the Contract and may be enforced by the Company without first taking any proceedings or exhausting any right or remedy against the Supplier or any other person or taking any action to enforce any other security, bond or guarantee.

4. The Guarantor shall be under no greater obligation or greater liability under this Guarantee than it would have been under the Contract if it had been named as the Supplier in the Contract.

5. The obligations and liabilities hereunder shall remain in full force and effect and shall not be affected, lessened, impaired or discharged by:

   (a) any alteration or variation to the terms of the Contract;

   (b) any alteration in the extent or nature or sequence or method or timing or scope of the works, services or supplies to be carried out under the Contract;

   (c) any extension of time being given to the Supplier or any other indulgence or concession to the Supplier or any forbearance, forgiveness or any other thing done, omitted or neglected to be done under the Contract;

   (d) any other bond, security or guarantee now or hereafter held for all or any part of the obligations of the Supplier under the Contract;

   (e) the release, modification, exchange or waiver of any such bond, security or guarantee;

   (f) any amalgamation or reconstruction or dissolution including liquidation of the Supplier;

   (g) the making of a winding up order, the appointment of a provisional liquidator, the passing of a resolution for winding up, liquidation, administration, receivership or insolvency of the Supplier;

   (h) any legal limitation, disability or incapacity relating to the Supplier (whether or not known to you);

   (i) any invalidity in, irregularity affecting or unenforceability of the obligations of the Supplier under the Contract;

   (j) the termination of the Contract; or

   (k) anything the Company or the Supplier may do or omit or neglect to do including, but without limitation, the assertion of or failure or delay to assert any right or remedy of the Company or the pursuit of any right or remedy by the Company.

6. Until all amounts which may be or become payable and all liabilities, obligations, warranties, duties and undertakings in respect of the Supplier's obligations have been irrevocably paid, performed or discharged in full, the Guarantor shall not, after a claim has been made or by virtue of any payment, performance or discharge by it under this Guarantee:

(a) be subrogated to any rights, security or moneys held, received or receivable by the Company or be entitled to any right of contribution or indemnity in respect of any payment made or moneys received on account of the Guarantor's liability under this Guarantee;

(b) claim, rank, prove or vote as a creditor of the Supplier or its estate in competition with the Company unless the Company so directs; or

(c) receive, claim or have the benefit of any payment distribution or security from or on account of the Supplier, or exercise any right of set-off against the Supplier unless the Company so directs.

7. This Guarantee is irrevocable.

8. The benefit of this Guarantee may be assigned by the Company at any time to any assignee of the benefit of the whole of the Contract. No further or other assignments shall be permitted.

9. The Guarantor:

(a) gives the guarantee contained in this Guarantee as principal obligor and not merely as surety;

(b) agrees to indemnify the Company on written demand against any loss or liability suffered by it if any provision set out in the Contract guaranteed by the Guarantor becomes unenforceable, invalid or illegal, and

(c) waives any right it may have of first requiring the Company to proceed against, or enforce any other rights or security or claim payment from, any person before claiming from the Guarantor under this Guarantee.

10. Until all amounts which may be or become payable in respect of the Supplier's obligations have been irrevocably paid in full by the Guarantor, the Company may:

(a) refrain from applying or enforcing any other moneys, security or rights held or received by the Company in respect of those amounts, or apply and enforce the same in such manner and order as it sees fit (whether against those amounts or otherwise) and the Guarantor shall not be entitled to the benefit of the same; and

(b) hold in a suspense account any moneys received from the Supplier on account of these Supplier's obligations or on account of the Guarantor's liability under this Guarantee.

11. The Company is entitled to make any number of demands under this Guarantee.

12. The invalidity, illegality or unenforceability in whole of or in part of any provisions of this Guarantee shall not affect the validity, legality and enforceability of the remaining part or provisions of this Guarantee.

13. This Guarantee may be executed in any number of counterparts each of which shall be an original and all of such counterparts taken together shall be deemed to constitute one and the same instrument.

14. No person other than TfL (as such term is defined in the Contract) and its subsidiaries (as defined in section 1159 of the Companies Act 2006) shall have any right to claim or remedy under or pursuant to this Guarantee and the provisions of the Contracts (Rights of Third Parties) Act 1999 are hereby excluded.

15. This Guarantee, executed and delivered as a deed, shall be governed by and interpreted according to the laws of England and the Courts of England shall have exclusive jurisdiction save that the Company shall have the right to bring proceedings in the courts of any other jurisdiction in which any of the Guarantor's assets may be situated.

16. [*For non-UK resident Guarantors only:*

For the purposes of this Guarantee the Guarantor hereby appoints ..... of ..... [to be a London address] to accept service of process on its behalf, and service on the said ..... at the said address shall be deemed to be good service on the Guarantor; and the Guarantor hereby irrevocably agrees not to revoke or terminate such appointment).]

Executed as a deed by the parties and delivered on the date of this Guarantee

Executed as a Deed by [GUARANTOR])

acting by) ……..

) Authorised Signatory

and) .....

) Authorised Signatory

Executed as a deed by affixing the Common Seal of)

[COMPANY])

in the presence of:-)

……..

[Authorised Signatory]

Executed as a Deed by [SUPPLIER])

acting by) ……..

) Authorised Signatory

and) .....

) Authorised Signatory

FORM OF ON DEMAND PERFORMANCE BOND WITH ANNEX 1

BOND

(Letterhead of Guarantor)

To: [Company name] (its successors in title and assigns)

Contract Bond No. [●]

1. Whereas our clients [●] (the "**Supplier**") have entered into a contract with you dated [●] (the "**Contract**") in respect of [●], we [●] (the "**Guarantor**", which term shall include our successors in title and assigns) hereby irrevocably undertake as a primary obligation upon first demand in writing made by you upon us from time to time or at any time to pay to you on each occasion the sum demanded by you within five (5) banking days upon service of your demand.

PROVIDED THAT:

2. This Bond shall come into force on the date hereof.

3. Any demand hereunder shall be substantially in the form of Annex to this Bond, and as between you and us the facts set out in that demand shall be: (a) deemed to be true and (b) accepted by us as conclusive evidence for the purposes of this Bond that the amount claimed in the demand is due and payable to you hereunder, it being our intention that the event upon which payment must be made hereunder is the service of your demand without any rights on our part to raise any objections, irrespective of the validity or the effectiveness of the Contract and the obligations arising thereunder and irrespective of the underlying facts or their significance under the Contract.

4. All sums payable under this Bond shall be paid in pounds sterling to such bank account as may be specified in your demand in immediately available funds, free of any restriction or condition and free and clear of and without any deduction or withholding whether for or on account of tax, by way of set-off, or otherwise, except to the extent required by law.

5. For the purpose of this paragraph 5, the expression "Expiry Date" means [●]. Our liability hereunder shall be limited as follows:

   (a) we shall have no liability in respect of any demand received after the Expiry Date; and

   (b) in respect of a demand or demands received on or before the Expiry Date, our liability shall not exceed the aggregate sum of £[●].

6. Our obligations hereunder shall remain in full force and effect and shall not in any way be affected, reduced or discharged by:

   (a) any alteration to the terms of the Contract made by agreement between you and the Supplier; and/or

(b) any defence, counterclaim, set-off or other deduction available to the Supplier under the Contract; and/or

(c) any alteration in the extent or nature or sequence or method or timing of the works/services to be carried out under the Contract; and/or

(d) any time being given to the Supplier or any other indulgence or concession to the Supplier or any forbearance, forgiveness or any other thing done, omitted or neglected to be done under the Contract; and/or

(e) any other bond, security or guarantee now or hereafter held by you for all or any part of the obligations of the Supplier under the Contract; and/or

(f) the release or waiver of any such other bond, security or guarantee; and/or

(g) any amalgamation or reconstruction or dissolution including liquidation or change in control or constitution of the Supplier; and/or

(h) the termination of the Contract; and/or

(i) any other event which might operate to discharge a guarantor at law or in equity.

7. Terms defined in the Contract and not otherwise defined herein shall have the same meaning in this Bond unless inconsistent with the context.

8. This Bond shall be governed by, and interpreted according to, the laws of England and the Courts of England shall have exclusive jurisdiction in relation to any claim, dispute or difference concerning this Bond and any matter arising from it save that you shall have the right to bring proceedings in the Courts of any other jurisdiction in which any of our assets may be situated.

9. This Bond may be assigned or transferred without our prior consent to any member of the TfL Group. Any other assignment or transfer of this Bond by either party shall require the consent of the other party, such consent not to be unreasonably withheld or delayed.

10. This bond may not be amended, varied or supplemented in any manner whatsoever without your prior written consent, other than in accordance with its express terms.

11. Each of the provisions of this bond is severable and distinct from the others, and if at any time any such provision is or becomes ineffective, inoperable, invalid or unenforceable it shall be severed and deemed to be deleted from this bond, and in such event the remaining provisions of this bond shall continue to have full force and effect.

12. All bank charges and other fees payable in relation to or in connection with this bond are for the account of the Manufacturer and you shall have no liability or responsibility therefor.

13. Except to the extent it is inconsistent with the express terms of this bond, this bond is subject to the ICC Uniform Rules for Demand Guarantees, 2010 revision, ICC Publication No. 758.

Executed as a deed by the parties and delivered on the date of this Bond.

Executed as a Deed by [GUARANTOR])

acting by) ……

) Authorised Signatory

and) .....

) Authorised Signatory

Executed as a deed by affixing the Common Seal of)

[COMPANY])

in the presence of:-)

……..

[Authorised Signatory]

ANNEX 1

Form of Demand from the Company to the Guarantor

Dear Sirs

[Contract Title]

Contract No: [●] (the "Contract")

We refer to the Bond given by you to us dated [●].

An event has occurred of the type described in Clause [●] of the Contract.

We hereby demand payment from you of the sum of £[●] under the Bond. Please make payment by CHAPS made payable to [Company name / bank account details].

Yours faithfully

.....

[Company name]

Windsor House

42-50 Victoria Street

London

SW1H 0TL

Schedule 9
Form of Collateral Warranty

THIS AGREEMENTS is made the day of 20[ ]

BETWEEN : -

(1) **London Underground Limited** registered in England and Wales under number: 01900907 and having its registered office at Windsor House, 42-50 Victoria Street, London SW1H 0TL (the "**Company**");

(2) [ ] a company registered in England and Wales under number: [……]and having its registered office at [.....] (the "**Sub-Contractor**"); and

(3) [ ] a company registered in England and Wales under number: [……]and having its registered office at [.....] (the "**Supplier**").

WHEREAS :-

(A) The Company has entered into a framework agreement, pursuant to which contracts may be made, with the Supplier (together the "**Main Contract**") pursuant to which the Supplier is to undertake and complete the following supply: [ ] (the "**Supply**").

(B) The Sub-Contractor has submitted a tender to the Supplier for the carrying out and completion of certain parts (the "**Sub-Contract Supply**") of the Supply referred to above as more particularly described in the tender.

NOW IN CONSIDERATION of the payment of £1 (one pound) by the Company to the Sub-Contractor (receipt of which the Sub-Contractor hereby acknowledges) IT IS HEREBY AGREED as follows:

1. The Sub-Contractor warrants to the Company that:

   (a) the Sub-Contract Supply have been and will be carried out with the skill and care to be expected of appropriately qualified and experienced professional contractors with experience in carrying out works or services of a similar type, nature and complexity to the Sub-Contract Supply;

   (b) reasonable skill and care has been and will continue to be exercised in connection with:

(i) the design of any goods, works or services to the extent that the Sub-Contractor has or will be responsible for such design;

(ii) the selection of all goods and materials comprised in the Sub-Contract Supply (in so far as such goods and materials have been or will be selected by the Sub-Contractor);

(iii) the satisfaction of any performance specification or requirement in so far as the same are included or referred to in the contract between the Supplier and the Sub-Contractor in relation to the Sub-Contract Supply (the "**Sub-Contract**");

(iv) the execution and completion of the Sub-Contract Supply;

(v) the Sub-Contract Supply will, on completion of the Main Contract, comply with all Applicable Laws and Standards (as such capitalised terms are defined in the Main Contract);

(c) the Sub-Contract Supply will be reasonably fit for the purposes for which they are intended (awareness of which purposes the Sub-Contractor hereby acknowledges) and in particular but without limitation will be so fit for the period and with a rate of deterioration reasonably to be expected of high quality, reliable, well designed and engineered goods, materials and construction; and

(d) it has the right to grant to the Company all licences (including without limitation all rights to sub-licence) of all intellectual property rights as contemplated in this Agreement.

For the purposes of construing the warranties in this Clause 1 references to the Sub-Contract Supply shall include any part of the Sub-Contract Supply. Each warranty shall be construed as a separate warranty and shall not be limited by reference to, or reference from, the terms of any other warranty or any other term of the Sub-Contract.

2. The Sub-Contractor shall, save in so far as he is delayed by any event in respect of which the Supplier is granted an extension of time under the Main Contract for completion of the Supply:

(a) Execute and complete the Sub-Contract Supply in accordance with the provisions of the Sub-Contract; and

(b) ensure that the Supplier shall not become entitled to any extension of time for completion of the Supply or to claim any additional payment under the Main Contract due to any failure or delay by the Sub-Contractor.

3. The Sub-Contractor shall from time to time supply the Company and the Supplier with such information as either may reasonably require.

4. To the extent that the intellectual property rights in any and all Documents have not already vested in the Company or the Supplier, the Sub-Contractor hereby grants to the Company an irrevocable, non-exclusive, non-terminable, royalty-free licence to copy and make full use of any and all Documents and all amendments and additions to them and any works, designs or inventions of the Sub-Contractor incorporated or referred to in them for the following purposes:

(a) understanding the Supply;

(b) operating, maintaining, repairing, modifying, altering, enhancing, re-figuring, correcting, replacing, re-procuring and re-tendering the Supply;

(c) extending, interfacing with, integrating with, connecting into and adjusting the Supply;

(d) enabling the Company to carry out the operation, maintenance repair, renewal and enhancement of the Underground Network (as such capitalised terms are defined in the Main Contract);

(e) executing and completing the Supply; and

(f) enabling the Company to perform its functions and duties as Infrastructure Manager and Operator of the Underground Network (as such capitalised terms are defined in the Main Contract)

provided always that the Supplier shall not be liable for the consequences of any use of the Documents as aforesaid for any other purpose. Such licence shall carry the right to grant sub-licences and shall be transferable to third parties without the prior consent of the Sub-Contractor.

For the purposes of this Clause, the term "**Documents**" shall mean documents, items of information, data, reports, drawings, specifications, plans, software, designs, inventions and any other materials provided by or on behalf of the Sub-Contractor in connection with the Sub-Contract (whether in existence or to be made).

5. The Sub-Contractor agrees:

(a) on request at any time to give the Company or any persons authorised by the Company access to the material referred to in Clause 4 and at the Company's expense to provide copies of any such material; and

(b) at the Sub-Contractor's expense to provide the Company with a set of all such material on completion of the Sub-Contract Supply.

6. The parties hereby agree that:

(a) this Agreement shall be personal to the Sub-Contractor;

(b) the Company may assign the benefit of this Agreement to any third party;

(c) the rights and remedies contained in this Agreement are cumulative and shall not exclude any other right or remedy available to either party in law or equity.

7. The Sub-Contractor warrants and undertakes to the Company that he has maintained and will continue to maintain all insurances required to be maintained pursuant to the terms of the Sub-Contract and that, insofar as he is responsible for the design of the Sub-Contract Supply, he has professional indemnity insurance with a limit of indemnity of not less than *[two million pounds (£2,000,000)]* in respect of each and every claim which may be made against the Sub-Contractor in respect of the Sub-Contract Supply. The Sub-Contractor shall maintain such professional indemnity insurance for a period of 12 years from completion of the Supply provided such insurance remains available at commercially reasonable rates and shall notify the Company forthwith if such insurance ceases to be so available. When deciding whether such insurances are available at commercially reasonable rates, no account shall be taken of any increase in the premium or imposition of terms which arise as a result of the Sub-Contractor's insurance claims record.

8. If any dispute of any kind whatsoever arises between the parties in connection with this Agreement or the Sub-Contract Supply which raises issues which are in opinion of the Company the same as or substantially the same as issues raised in a related dispute (the "**Related Dispute**") between the Company and the Supplier and such Related Dispute has already been referred to a conciliator or arbitrator appointed under the provisions to that effect contained in the Main Contract, then the Sub-Contractor hereby agrees that the Company may at his discretion by giving notice in writing to the Sub-Contractor refer the dispute arising out of this Agreement or the Sub-Contract Supply to the adjudicator, conciliator, arbitrator or other party (the "**Appointed Party**") appointed to determine the Related Dispute. In this event the

Appointed Party shall have power to give such directions for the determination of the dispute and the Related Dispute as he may think fit and to make such awards as may be necessary in the same way as if the procedure of the High Court as to joining one or more defendants or joint co-defendants or third parties was available to the parties and to him.

9. (a) Neither the Sub-Contractor nor the Supplier shall exercise or seek to exercise any right which may be or become available to it to terminate or treat as terminated the Sub-Contract or discontinue or suspend the performance of any of its duties or obligations thereunder or treat the Sub-Contract as determined without first giving to the Supplier or the Sub-Contractor (as applicable) not less than 35 days prior written notice of its intention to do so, with a copy to the Company, specifying the Sub-Contractor's or Supplier's grounds for terminating or treating as terminated the Sub-Contract or discontinuing or suspending its performance thereof or treating the Sub-Contract as determined.

(b) If the Main Contract is terminated for any reason, within 35 days of such termination the Company may give written notice to the Sub-Contractor and to the Supplier (a "**Step-in Notice**") that the Company or its appointee shall henceforth become the Supplier under the Sub-Contract in accordance with the terms of sub-clause (c) below.

(c) With effect from the date of the service of any Step-in Notice:

(i) the Company or its appointee shall be substituted in the Sub-Contract as the Supplier thereunder in place of the Supplier and references in the Sub-Contract to the Supplier shall be construed as references to the Company or its appointee;

(ii) the Sub-Contractor shall be bound to continue with the performance of its duties and obligations under the Sub-Contract and any exercise or purported exercise by the Sub-Contractor prior to the date of the Step-in Notice of any right to terminate or treat as terminated the Sub-Contract or to discontinue or suspend the performance of any of its duties or obligations thereunder or to treat the Sub-Contract as automatically determined shall be of no effect;

(iii) the Company shall become bound by the terms and conditions of the Sub-Contract in respect of all obligations and duties of the Supplier thereunder which fall to be performed after the date of the Step-in Notice and shall promptly thereafter make payment of any amounts properly due to the Sub-Contractor as at the date of the Step-in Notice and still outstanding; and

(iv) the Supplier shall be released from further performance of the duties and obligations of the Supplier under the Sub-Contract after the date of the Step-in Notice, but without prejudice to any rights and remedies of:

(1) the Sub-Contractor against the Supplier in respect of any matter or thing done or omitted to be done by the Supplier on or before the date of the Step-in Notice; and

(2) the Supplier against the Sub-Contractor in respect of any matter or thing done or omitted to be done by the Sub-Contractor on or before the date of the Step-in Notice.

(d) Notwithstanding anything contained in this Agreement and notwithstanding any payments which may be made by the Company to the Sub-Contractor, the Company shall not be under any obligation to the Sub-Contractor and the Sub-Contractor shall not be under any obligation to the Company unless the Company shall have served a Step-in Notice pursuant to Clause 9(b) above.

10. The Sub-Contractor's liabilities, duties and obligations hereunder shall be no greater and of no longer duration than the liabilities, duties and obligations which the Sub-Contractor owes to the Supplier under the Sub-Contract.

11. The Sub-Contractor further undertakes to indemnify the Company from and against the consequences of any breach by the Sub-Contractor of any of the warranties, covenants and undertakings contained in this Agreement.

12. The rights and benefits conferred upon the Company by this Agreement are in addition to any other rights and remedies that the Company may have against the Sub-Contractor including, without prejudice to the generality of the foregoing, any remedies in negligence.

13. Nothing contained in this Agreement shall in any way limit the obligations of the Supplier to the Company arising under the Main Contract or otherwise undertaken by the Supplier to the Company in relation to the Sub-Contract Supply.

14. No amendment to this Agreement shall be valid unless it is in writing and signed by all parties.

15. Any person who is not a party to this Agreement may not enforce any of its terms under the Contracts (Rights of Third Parties) Act 1999.

16. This Agreement shall be governed by and construed in accordance with English law and shall be subject to the exclusive jurisdiction of the Courts of England and Wales.

Executed as deed by the parties and delivered on the date of this Agreement.

Executed as a deed by affixing the Common Seal of)

London Underground Limited)

in the presence of:-)

……..

[Authorised Signatory]

Executed as a Deed by [SUB-CONTRACTOR])

acting by) ……..

) Authorised Signatory

and) .....

) Authorised Signatory

Executed as a Deed by [SUPPLIER])

acting by) ……..

) Authorised Signatory

and) .....

) Authorised Signatory

Schedule 10 Supplier Performance

1

1.1. KEY PERFORMANCE INDICATORS

1.1.1. DELIVERY – The target is 100% on time delivery, to the agreed times included in the Material Contract Data Sheets. Failure to meet delivery times will attract the following abatements against the full order value of all Goods due to be delivered in the measured period. This will be measured for each Accounting Period.

Delivery Performance by Value	**Abatement Attracted on Full Value of orders**
>= 99.00%	0%
97.00% - 98.99%	1%
95.00% - 96.99%	2%
90.00% - 94.99%	3%
80.00% - 89.99%	4%
<80.00%	5%

1.1.2. Not required

1.2. SDI PERFORMANCE CRITERIA / SERVICE DELIVERY INDICATORS (SDI's)

1.2.1. QUALITY – The Supplier will supply Goods with 0% Defects. When Defects are found the escalation process will begin in the following circumstances:

1.2.1.1. Non Safety Critical Goods

- Defects found in 3 or more Accounting Periods over a rolling six Accounting Periods; or
- Defects found in over 2% of Goods Delivered in an Accounting Period.

1.2.1.2. Safety Critical Goods

- Any single Defect

1.2.2. STOCK HOLDING – The Supplier shall maintain the value of agreed stock holding.

Where the stock holding is:

- below 100% for 4 or more Accounting Periods over a rolling six Accounting Periods;

- below 90% for 2 or 3 Accounting Periods over a rolling six Accounting Periods; or
- below 75% in any single Accounting Period,

the escalation process shall begin.

- Stock holding to be measured by review of the agreed delivery schedules, Contract Programme and in line with London Underground's Material Team.

2. ESCALATION PROCESS

In the event of unsatisfactory performance standards, including (but not limited to) failure to reach the targets set by the Service Delivery Indicators, failure to reach the targets set by the key performance indicators (in 1.1. above), faults open beyond the rectification time and any other deficiencies in performance, the escalation process shall be invoked by the Company in their absolute discretion.

The purpose of the escalation process is to provide a structured framework within which the Parties can address unsatisfactory performance standards against timescales and deliverable targets. For the purposes of this process notified levels of poor performance will be termed "**Non-Conformances**".

This procedure operates with four levels; the lowest level Non-Conformance being Level 1. Should Non-Conformances escalate they will receive an appropriate level of management intervention from the Company and the Supplier. Level 3 gives final review and opportunity for remedial actions to resolve issues before the Non-Conformance reaches Level 4, which will entitle the Company to terminate in accordance with Clause 21.1 of this Agreement.

In the event that a performance issue is not resolved between the Company and the Supplier then the Non-Conformance may be raised formally to a Level 1 or Level 2 Non-Conformance, depending upon the severity of the performance failure. It is possible for a number of Level 1 and/or Level 2 issues to be in hand at any one time.

Summary of Escalation Process

TRIGGER	**LEVEL**	**ACTION**	**BY**	**RESULT**
Failure to rectify identified non- conformance issued as part of KPIs and/ or SDIs	LEVEL 1	Improvement plan with precise end date required. On going review dates specified.	Supplier	Satisfactory - Stop Unsatisfactory - Level 2

TRIGGER	LEVEL	ACTION	BY	RESULT
Level 1 re-occurrence Consistent failure to meet required requirement Safety Condition infringements.	LEVEL 2	Improvement plan with precise end date required. Ongoing review dates specified.	Supplier	Satisfactory - Stop Unsatisfactory - Level 3
Level 2 re-occurrence	LEVEL 3	Final review. Final opportunity for remedial action. Precise end date required.	Supplier	Satisfactory - Stop Unsatisfactory - Level 4
Level 3 re-occurrence	LEVEL 4	POSSIBLE TERMINATION		

Issues shall be resolved locally on a day-to-day basis to the mutual satisfaction of all Parties and shall not be raised to Level 1 without prior endeavours to resolve. At this stage of the process, the Supplier may be required to supply a Root Cause Analysis and a Recovery Plan.

Level 1

The Level 1 Non-Conformance will be recorded by the Company and a notice submitted to the Supplier. The Supplier shall in response (such response to be within 10 Business Days of service of the notice by the Company) prepare and submit to the Company a Level 1 Non-Conformance Report. Such report will contain:

- Confirmation of the date and details of the Level 1 Non-Conformance
- The steps to be taken by the Supplier to ensure there is no repetition of such Level 1 Non-Conformance (the "**Level 1 Required Action**")
- The time within which such Level 1 Required Action is to be completed (which shall be a reasonable period and no longer than the "**Level 1 Rectification Period**").

The Supplier and the Company will use all reasonable endeavours to agree the Level 1 Rectification Period and the Level 1 Required Action. If the agreed Level 1 Required Action is carried out within the agreed Level 1 Rectification Period then the Non-Conformance will be classed as closed.

Level 2

If the Company determines, that a Non-Conformance should be treated as a Level 2 Non-Conformance; or the Supplier fails to provide the Company with a Level 1 Non-Conformance Report within 10 Business Days; or the Supplier fails to rectify the Level 1 Non-Conformance within the Level 1 Rectification Period, then this shall be a "**Level 2 Non-Conformance**" and the Company will submit a notice to the Supplier.

The Supplier shall in response (such response to be within 10 Business Days of service of the notice by the Company) prepare and submit to the Company a Level 2 Non-Conformance Report. Such report will contain:

- Confirmation of the date and details of the Level 2 Non-Conformance
- The steps to be taken by the Supplier to ensure there is no repetition of such Level 2 Non-Conformance (the "**Level 2 Required Action**")
- The time within which such Level 2 Required Action is to be completed (which shall be a reasonable period and no longer than the "**Level 2 Rectification Period**").

The Supplier and the Company will use all reasonable endeavours to agree the Level 2 Rectification Period and the Level 2 Required Action.

If the Level 2 Required Action is taken within the agreed Level 2 Rectification Period then the Non-Conformance will be considered resolved. However, a record of the Non-Conformance will be made and Level 2 trends monitored.

Level 3

If the Company determines, that a Non-Conformance should be treated as a Level 3 Non-Conformance; or the Supplier fails to provide the Company with a Level 2 Non-Conformance Report within 10 Business Days; or the Supplier fails to rectify the Level 2 Non-Conformance within the Level 2 Rectification Period, then this shall be a "**Level 3 Non-Conformance**" and the Company will submit a notice to the Supplier.

The Supplier will provide the Company a report (a "**Level 3 Non-Conformance Report**"), setting out the steps which the Supplier has taken, or will take, to ensure that no further Non-Conformances of this type shall arise (the "**Level 3 Required Action**"); and the period (being no greater than 2 months from the time of occurrence of the Level 3 Non-Conformance for the Supplier to put in place steps to ensure that no further Non-Conformances of the same type occur (the "**Level 3 Rectification Period**").

Level 4

The Supplier fails to provide the Company by the agreed deadline, a Level 3 Non-Conformance Report; or the Supplier fails to undertake the Level 3 Required Action within the Level 3 Rectification Period; or the Supplier fails to rectify the Level 3 Non-Conformance within the Level 3 Rectification Period.