

# Operating and Maintenance Specification for TC02 Type S2 Stillage and Type L2 Lifting Frame

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*Project title:* **Low Level Waste ISO Freight Containers**

*Project number:* **34/09227**

*Bldg name/number:* **B746**

*Document ref:* **OM/3409227/MECH/00002/C**

*Purpose of issue:* **For Operational Use**

*Date of issue:* **02 Jul 2014**


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*Level of checking:* **Level 3**

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*Approver's position:* **Package Design Authority**

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## History sheet

Rev	Date	Reason for revision	Revised by
A	25/01/13	First approved issue	R E Millington
B	20/03/13	Section 8.2 and 8.4 updated	R E Millington
C	02/07/14	<p>Security Marking amended</p> <p>Title amended to include lifting frame</p> <p>Section 3 –updated</p> <p>Section 5 – title amended to include lifting frame.</p> <p>Section 5.1 – updated with details of the lifting frame L2 (from 6.1).</p> <p>Section 6.1 – lifting frame handling capability added</p> <p>Section 6.3 – removed details of lifting frame (moved into section 5.1) and warning regarding pre-use examination added.</p> <p>Section 7 – title amended to include lifting frame.</p> <p>Section 7.1 – and lifting frame added to description.</p> <p>Section 7.2 – title amended to specify stillage.</p> <p>Section 7.4 – new section added with tabulated inspection information.</p> <p>Section 7.5 – para i) amended to include “at time of use”.</p> <p>Section 8.2 - Caution regarding approved Waste Loading Plan added.</p> <p>Section 10 – new para 3, lifting equipment inspected in accordance with LOLER</p> <p>Section 13.6.2 – acceptance criteria for ‘NO GO’ threaded gauge reduced from 3 full thread pitches.</p> <p>Appendix A – L2 frame and L2/FLA weights added.</p>	B Mellor

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## Definitions/Glossary

ALARP	As Low As Reasonably Practicable
Consignor	Consignor according to the provisions of ADR
Container Operator	Owner of the Container
Contract Authority	LLW Repository Ltd
CSC	(International) Convention for Safe Containers
Design Authority	Head of Engineering LLW Repository Ltd., Holmrook, Cumbria
EIMT	Examination, Inspection, Maintenance and Testing
IAEA	International Atomic Energy Agency.
IP-2	Industrial Container Type 2
ISO	International Standards Organisation.
Lifting Features	Integral load features specially designed for lifting, such as trunions, lugs, plain holes and threaded holes
LLW	Low Level Waste
LLWR	Low Level Waste Repository
LQR	Lifetime Quality Record
LSA	Low Specific Activity
Manufacturer	The organisation responsible for producing hardware in accordance with the requirements of the Contract Authority.
MPI	Magnetic Particle Inspection
MQP	Maintenance Quality Plan
NDT	Non-Destructive Testing
OI	Operating Instructions
O&M	Operating & Maintenance
OQP	Operational Quality Plan
SCO	Surface Contaminated Object
SQEP	Suitably Qualified and Experienced Person
WAC	Waste Acceptance Criteria
WLL	Working Load Limit

## 1 Introduction

This document provides the Package Design Authorities guidance regarding the O&M requirements for the type S2 (Large Item) stillage which forms part of the TC02 IP-2 packaging system.

The stillage is designed to accommodate large items of contaminated plant and equipment.

## 2 Scope

This document identifies the design intent for the operation and maintenance of the S2 stillage and is to be used as an aid to producing detailed Operating and Maintenance Instructions. It provides an outline of the O&M tasks to be carried out at specified intervals together with the acceptance requirements that must be satisfied. Adherence to the Operating and Maintenance requirements will ensure that the equipment remains in a serviceable and safe condition to meet the design parameters and maintain regulatory compliance within the safety justification.

The O&M guidance addresses the following issues:

- a) Stillage handling operations (including turn-round inspection), to be carried out as required at loading and unloading, consisting of minor tasks only, which can be carried out by the operational staff under the Operational Quality Plan (OQP).
- b) Planned maintenance and periodicity as performed by maintenance staff in accordance with a Maintenance Quality Plan (MQP).
- c) Acceptance criteria requirements (norms and tests)

## 3 Compliance

The Consignor is responsible for ensuring that the regulatory requirements governing the use of the stillage and associated transport package are complied with, such as current editions of:

- Health and safety at work act
- Personnel protective equipment at work regulations
- Provision and use of work equipment regulations (PUWER)
- Manual Handling Regulations
- Ionising radiation regulations
- Control of substance hazardous to health (COSHH)
- Supply of Machinery (Safety) Regulations
- IAEA Regulations for the Safe Transport of Radioactive Material
- Lifting operations and lifting equipment regulations (LOLER)
- International conventions for safe containers
- The Package Approval Certificate

## 4 Responsibilities

It is the Consignors responsibility to ensure that:

- All local and regulatory requirements governing radioactive materials and transport packages are complied with
- Stillage operating and inspection activities are carried out in compliance with a quality management system that meets the requirements of BS EN ISO 9001 [1].
- Reference is made to the Certificate of Approval for the TC02 package identifying information on approved contents and other shipment and operating requirements.
- The material to be consigned satisfies the regulatory requirements for transport within the TC02 package and complies with the acceptance criteria for the receiving facility.
- Personnel associated with packing, loading, unloading and handling the stillage are instructed to carry out the required operations as quickly as practicable without compromising safety in order to ensure personal radiation dose is ALARP.

## 5 Stillage Type S2 and Lifting Frame Type L2 Description

### 5.1 General

The stillage is uniquely identified by the design number S2. It is essentially a full size stillage which is designed to be used in conjunction with the TC02 IP-2 ISO freight container. The stillage (Figure 1) is a carbon steel fabrication comprising of a base structure and a superstructure comprising of eight upright channel sections (four per side) which house the manual locking mechanisms used to secure the stillage within the TC02 container. The central group of four uprights (two per side) incorporate the stillage lifting features. The superstructure also includes supplementary steelwork used to position and anchor removable payload restraint assemblies.

Each stillage measures 5385 mm x 1950 mm x 1065 mm high. Only one Type S2 stillage can be accommodated within the TC02 container (Figure 5)

The stillage base assembly is fitted with two sets of adjustable base end restraints which are used to restrain the payload in the longitudinal direction. Lateral restraint of the payload is achieved using the stillage superstructure side members and payload specific supplementary chocking secured to the floor plate and/or side members.

The stillage is fitted with an array of 'D' rings for anchoring webbing straps for securing the payload. Each 'D' ring has a rated capacity of 3 tonnes.

The S2 stillage can be adapted to incorporate bespoke payload specific restraint systems.

A dedicated type L2 stillage lifting frame (Figure 4) is used for loading the stillage into and unloading the stillage out of the TC02 package. The lifting frame, which is used for both the S2 and S3 stillages, is a four point lifting frame with a rated WLL of 30 tonnes. It incorporates four clevis blocks which engage with the four uprights of the stillage using the attached lifting pins. Fitted to the top of each of the four clevis blocks is a triple swivel load ring, connected to which are the individual legs of a four leg chain sling for connection to a single crane hook.

### 5.2 Maximum payload capacity

The S2 stillage has a maximum payload capacity of 27.5 tonnes.

## 6 Stillage Handling Operations

### 6.1 General

The consignor shall have a QA documented system in place covering the stillage inspection, handling, loading and dispatch activities as identified in this specification, which shall consider all operational hazards and limits such as.

- Stillage inventory
- Stillage lift heights
- Stillage payload size, weight, etc.
- Lifting Frame handling capability
- Radiation and contamination levels.

### 6.2 Stillage Handling Methods

**WARNING: ALL STILLAGE LIFTING AND HANDLING EQUIPMENT MUST BE ADEQUATELY RATED TO HANDLE THE FULLY LADEN STILLAGE SAFELY.**

When loaded in the TC02 package, the stillage is restrained using the eight twist lock mechanisms that are incorporated into the stillage uprights. Each twist lock engages with a receiving aperture housing welded to the container floor. Before commencing any lifting operations, the stillage must be free to be lifted e.g. ensure that the twist locks mechanisms that secure the stillage inside the TC02 package are unlocked. (See Figure 2)

### 6.3 Lifting the stillage with the type L2 lifting frame

**WARNING: LIFTING THE STILLAGE FROM THE TOP LIFTING FEATURES MUST ONLY BE CONDUCTED USING THE DEDICATED TYPE L2 STILLAGE LIFTING FRAME.**

**WARNING: PRE-USE EXAMINATIONS AS DETAILED IN SECTION 7.4 MUST BE COMPLETED SATISFACTORILY BEFORE USE.**

**CAUTION: Ensure all eight stillage locking mechanisms are unlocked before commencing lifting operations. Note: The type L2 lifting frame cannot be attached to the S2 stillage unless the locking mechanisms are in the unlocked position.**

**CAUTION: The four leg chain sling must NOT be connected directly to the stillage uprights; it must only be used in conjunction with the lifting frame.**

Before lowering the lifting frame onto the stillage, the stillage locking handles must be unlocked; otherwise the lifting pins cannot be engaged.

As an alternative to lifting the type L2 lifting frame and stillage with a crane, the four leg chain sling can be unlatched from the lifting frame and substituted with a purpose designed fork lift adaptor to facilitate lifting the frame with a fork lift truck.

## 7 Turn-round Inspection of the Stillage and Lifting Frame

### 7.1 General

The stillage and lifting frame should be in a fit-for-purpose condition before being used and shall satisfy the inspection/checking criteria described below as a minimum. All inspections must be carried out by a Suitably Qualified and Experienced Person (SQEP). If any defects, incidents or abnormalities are identified then the stillage and/or lifting frame shall be placed on hold and it must be reported to the Contract Authority for resolution.

**7.2 Summary of Turn-round Inspection of the Stillage**

On stillage turn-round (i.e. loading and unloading) at consignor and consignee facilities, the following visual inspections, shall take place. Record of these inspections shall be kept and any defects or difficulties reported.

Ref.	Inspection Requirement	Record Requirement	Acceptance Criteria Ref
1.	Stillage general condition	Cleanliness, corrosion, defect, wear	7.3
2.	Lifting features	Wear, interface, clearances, any defects or difficulties	7.3
3.	Ratchet Straps (where fitted)	Damage, wear	7.3
4.	Payload restraint features.	Damage, wear, interface, clearances, any defects or difficulties	7.3
5	Stillage markings	All markings/labels present and legible	7.3
6.	Twist locks	Damage, wear, interface, clearances, any defects or difficulties	7.3

**Table 1- Turnaround inspection requirements for TC02 Type S2 stillage**

All appropriate operation and maintenance defects/incidents and abnormalities are to be documented and reported to the Contract Authority.

**7.3 Visual Inspection of Stillage**

**WARNING: Inspection of the stillage underside should only be carried out from the side of the stillage unless it is supported on adequately rated trestles (do not work under a suspended load).**

Confirm all the parts are present and inspect the stillage(s) for signs of damage. This shall include a visual inspection of the following:

- i) Stillage uprights and base structure for signs of corrosion, damage, deformation or cracks in welds or structural members. There shall be no corrosion, mechanical damage, cracks, distortion or gross deformation present. Note: dents greater than 15 mm deep, bowing or bending greater than 5 mm beyond plane are unacceptable defects.
- ii) Payload anchor points on stillage. There shall be no corrosion, mechanical damage, cracks, distortion or gross deformation present.
- iii) Lifting points. There shall be no corrosion, cracks, distortion, gross deformation or excessive wear present.
- iv) Twist lock assemblies - There shall be no excessive wear, mechanical damage, corrosion, deformation, change in section, or cracks evident in the members or welds associated with the stillage twist locks. Each twist lock mechanism should operate smoothly throughout the full 90 degrees of operation
- v) Chocks and their fixings. There shall be no corrosion, cracks, damage or deformation visible.



- vi) Floor of the stillage. There shall be no corrosion, cracks or deformation of the floor plates or associated welds.
- vii) Decals and labels. All shall be present, legible and securely fixed.
- viii) Paint finish. The paint finish shall be intact and not flaking. Minor chips and worn areas are acceptable provided base metal is not exposed to such an extent where corrosion is present.
- ix) Ratchet straps (where fitted). The webbing straps shall be free from tears, cuts, nicks and breaks in load bearing fibres and retaining stitches. The straps shall be free from deformation resulting from exposure to heat. The end fittings and tensioning devices shall be free from damage, deformations, and splits, signs of excessive wear or corrosion.

If any damage is found the stillage shall be placed on hold and the Contract Authority notified.

**7.4 Summary of Pre-use Inspection of the Lifting frame**

On turn-round (i.e. loading and unloading) at consignor and consignee facilities, the following visual inspections, shall take place. Record of these inspections shall be kept and any defects or difficulties reported.

Ref.	Inspection Requirement	Record Requirement	Acceptance Criteria Ref
1.	Lifting Equipment Date Tag	In date	7.5
2.	All four lifting pins on the lifting frame	Missing, corrosion, cracks, damage, or wear.	7.5
3.	Structural members and associated welds	Corrosion, cracks, damage or wear.	7.5
4.	Four leg chain	Corrosion, cracks, damage or wear.	7.5

**Table 2- Lifting Frame pre-use Inspection Requirements**

**7.5 Visual Inspection of the Lifting frame**

Visual inspection and maintenance of the lifting frame shall be in accordance with the item owners processes and procedures this will typically include a visual inspection of the following.

- i) The date tag to confirm the lifting frame is in date at the time of use.
- ii) All four lifting pins on the lifting frame. All four shall be present with lynch pins fitted. There shall be no cracks, distortion, gross deformation or excessive wear present.
- iii) Structural members and associated welds. There shall be no corrosion, cracks, damage or deformation present.
- iv) Four leg chain and swivel connectors. There shall be no signs of corrosion, excessive wear, damage or deformation present. Swivel connectors should rotate freely.

If any damage or defects are found on the lifting frame advice should be sought from the relevant authorised person for lifting operations.

**NOTE: The item owner is solely responsible for ensuring the appropriate statutory thorough examinations take place in accordance with the Lifting Operations and Lifting Equipment Regulations [2]**

**NOTE: Lifting frames hired from LLWR will be provided with documentation detailing the next statutory examination due date.**

## 8 Preparing, Loading, and Unloading of the Stillage

### 8.1 Removal of the S2 stillage from the TC02 container

#### 8.1.1 Preliminaries

**NOTE: When lifting the S2 stillage out of the TC02 container using the TC02/L2 lifting frame, a minimum lifting height of 3.9 m is required above the top of the container.**

Once the lid of the TC02 container has been removed (refer to TC02 operating specification, OM/LLWRGR/MECH/00001 [3]), operate the eight stillage locking mechanisms to unlock the stillage from the container base as shown in Figure 2.

Attach the L2 lifting frame in accordance with 8.1.2

#### 8.1.2 Attaching the type L2 lifting frame to the stillage

**NOTE: The type L2 lifting frame has been designed such that it cannot be fitted to the stillage when the stillage twist lock mechanisms are in the closed/locked positions in order to prevent the stillage from inadvertently being lifted when fixed to the container.**

To attach the type L2 lifting frame to the stillage:

- i) Confirm all eight stillage locking mechanisms are in the unlocked/open position
- ii) Remove the lynchpins from the ends of the four lifting pins and withdraw the lifting pins from the clevis blocks. Replace the lynchpins into the lifting pins and store them on the chain tray.
- iii) Guide the lifting frame over the top of the stillage and align the four clevis blocks with the four central stillage channel uprights.
- iv) Lower the lifting frame on to the stillage, ensuring each of the four clevis blocks engage in the corresponding channel uprights of the stillage (See Figure 4).
- v) Insert each of the four lifting pins through both the lifting frame and stillage uprights and, ensuring the lifting pins are fully engaged, re-fit the lynchpins in the lifting pins.

#### 8.1.3 Lifting the stillage

Once the lifting frame has been attached in accordance with 8.1.2 above, lift the stillage out of the container and place on a flat & level hard standing/floor.

**Note: When setting the stillage down, care must be taken to ensure that the stillage is set down on a hard, flat and level surface that is clear of any sharp objects that could cause damage. The set down area should also have sufficient space to enable access on all four sides of the stillage to facilitate the loading or unloading of the stillage payload.**

Following the removal of the stillage from the TC02 container, ensure that inspection of the container internals is carried out in accordance with reference [3].

#### 8.1.4 Detaching the type L2 lifting frame from the stillage

To detach the type L2 lifting frame from the stillage:

- i) Remove the lynchpins from the end of each of the four lifting pins and pull out each lifting pin. Replace the lynchpins into the lifting pins and store them on the chain tray.
- ii) Lift the lifting frame clear of the stillage and lower off onto a suitable clean flat surface
- iii) Lower the lifting chain down into the chain tray to ensure no chain is resting on the floor

## 8.2 Loading and securing the stillage payload.

**Note:** Prior to loading the payload onto the stillage, visually inspect the stillage in accordance with Section 7.3.

**CAUTION:** The payload must only be loaded on the stillage in accordance with an approved Waste Loading Plan which specifically references section 8.2 and section 9 of this Operating and Maintenance Specification.

**CAUTION:** When loading the S2 stillages. The payload must be evenly distributed as far as practicable so that no more than 60% of the total load is distributed over less than 50% of the stillage length to ensure a balanced load.

The S2 stillage has been rated for a payload of 27.5 tonnes evenly loaded over the stillage base. The WLL of the stillage is clearly marked on it and must not be exceeded.

The maximum load space dimensions of the stillage (L x W x H) is 5060mm x 1680mm x 930mm.

The removable restraints (base end, top end and top mid beams, where fitted) can be temporarily removed to improve access to the stillage load space when loading the payload.

The payload must be placed such that the centre of gravity of the laden stillage is as central as possible. Item(s) placed on the stillage should be located in such a way that no more than 60% of the total stillage payload is placed over less than 50% of the stillage floor area.

All items of plant or equipment to be loaded on the stillage shall be prepared in accordance with Section 9.

Once the payload has been loaded, the payload must be adequately restrained to withstand the dynamic accelerations imposed under normal conditions of transport. The restraint configuration used is generally dependent upon the specific payload to be transported. .

**NOTE:** The base end and top end adjustable restraints provide longitudinal restraint to the stillage payload and should be positioned such that they abutt the payload. Lateral restraint is provided by the steelwork affixed to the sides of the stillage. Where the physical size or geometry of the payload is such that it does not abut the end or side restraints additional chocks or dunnage must be used to restrict the movement of the payload during normal conditions of transport.

## 8.3 Removal of Payload from the Stillage

Once a laden stillage has been removed from the container and set down, the payload can be removed. Loosen and remove any webbing ratchet straps securing the payload and remove the base end restraint assemblies to facilitate access for unloading/loading of the payload.

Remove payload from the stillage referencing any consignor's guidance as appropriate.

Following the removal of the payload from the stillage, inspect the stillage in accordance with section 7.3.

**NOTE:** the restraint assemblies are to remain with the stillage for re-use on future loads.

## 8.4 Loading and Securing of the Stillage into the Container

### 8.4.1 Preliminaries

Before loading a stillage into the TC02 container, the payload must be secured to the stillage in accordance with section 8.2.

The S2 stillages can be placed either way around within the TC02 container.

When loading an S2 stillage, it must be placed centrally within the container and locate on all eight tie-down points, as shown in Figure 7.

#### 8.4.2 Loading and Securing of the Stillage

Attach the L2 lifting frame to the stillage in accordance with Section 8.1.2.

Lift the stillage over the TC02 container and align the eight stillage uprights over the tie-down points in the base of the container - Guides have been marked on top of the container to assist with the stillage alignment over the tie-down points.

Once the stillage is correctly aligned, lower off the stillage into the container so that the eight uprights engage correctly with the tie-down points in the base of the container.

On confirmation that the stillage is correctly seated in the container, detach the L2 lifting frame in accordance with Section 8.1.4 and turn the eight stillage twist locks to the locked/closed position, as shown in Figure 2.

Once the stillage has been loaded and locked in place, replace the container lid in accordance with reference [3].

**CAUTION: The container cannot be assembled for transport with the stillage lifting frame in place.**

## 9 Payload Preparation

For loading items of plant or equipment on to the stillage, a payload specific loading plan (WSC-FOR-WLP) must be completed and submitted to and approved by the Contract Authority prior to loading to ensure that any issues at the receiving facility can be addressed.

To minimise contamination of the container internals, items placed on the stillage shall be pre-wrapped in suitable semi-flexible packaging. Advice can be provided by the Contract Authority upon request.

When restraining items of plant or equipment, they must be restrained to prevent movement under normal conditions of transport using the adjustable base end restraint assemblies, webbing ratchet straps and any supplementary chocks or dunnage required by the loading plan.

## 10 Planned Maintenance

Planned maintenance shall be performed under a Maintenance Quality Plan (MQP): it is a regulatory requirement to ensure compliance with the package design safety case. The level of maintenance and frequency recommended in this document will ensure that suitable maintenance regimes are implemented throughout the design life of the stillage.

It is the responsibility of the container operator (LLWR) to carry out maintenance in accordance with the MQP. The consignor must check the supplied documentation, which will clearly define the next maintenance due date. The consignor must check that this date has not passed.

Lifting equipment used to lift the container or stillage (Lifting Frame TC02/L2) are maintained/inspected in accordance with the statutory requirements of the Lifting Operations and Lifting Equipment Regulations (LOLER) 1998 [2] and are not covered in this document.

Maintenance activities are presented in the tables below for the main stillage items as follows:

- Stillage base assembly – Table
- Lifting and Tie-down features – Table

### On Package receipt at maintenance facility:

- Review Maintenance Quality Plan (MQP)
- Record stillage identification. (S2/serial number)
- Check receipt documentation.
- Carry out HP survey; ensuring results are within prescribed limits.
- Review previous maintenance LQR package and operational defect reports.

### On commencement and during maintenance:

- Ensure a safe system of work is in place.
- Ensure as components are removed, HP monitoring activities are carried out - decontaminate/clean as required
- Ensure components removed are held in an appropriately controlled area.
- Ensure all handling of the stillage complies with this specification.
- Ensure that any spares used are inspected/certified, correctly identified and their usage recorded in the LQR.
- Ensure defective components are suitably labelled and quarantined.
- Record the serial numbers and calibration dates of all test equipment or special tools used.
- Ensure before any functional tests are carried out all necessary clearances/permits to work are in place.
- Proof load testing must be considered, by referral to the Design Authority, whenever new untested or repaired load bearing components are fitted. If new inspected and certified components are used the package shall be tested using the appropriate self-weight.
- Special attention shall be given to lifting features, which may be affected by corrosion.
- Ensure all necessary records are completed

Ref.	Maintenance Activity	Maintenance Frequency Required (✓)		
		12 months	5 years	Acceptance Criteria Ref.
1.	Inspect for wear, damage and corrosion	✓	✓	13.2 13.3
2.	Ensure all components are in place	✓	✓	13.1.2
3.	Ensure required markings, identification labels/plates and warning labels are in place, free from damage and are legible.	✓	✓	13.1.3
4.	Assess paint finish. Touch up or repair as required	✓	✓	13.2
5.	Functionally test stillage locking mechanism	✓	✓	13.1.1 13.8
6.	Functionally test adjustable base end restraint assemblies	✓	✓	13.1.1
7.	Visually check 'D' ring anchor points	✓	✓	13.4, 13.5 13.8
8.	Inspect threads and inserts for wear	✓(1)	✓(2)	1. 13.6.1, 13.7 2. 13.6.2, 13.7
9.	Inspect bolts, screws and nuts for wear	✓(1)	✓(2)	1. 13.6.1, 13.7 2. 13.6.2, 13.7

Table 3: S2 stillage base assembly

Ref	Maintenance Activity	Maintenance Frequency Required (✓)		
		12 months	5 years	Acceptance Criteria Ref
1.	Inspect lifting features for wear, damage, deformity and corrosion. Measure and record	✓	✓	13.4
2.	Confirm testing/certification documentation for proof load testing of assemblies and components is available.	✓	✓	Review LQR's
3.	Visually check that all components are in place.	✓	✓	13.1.2
4.	For welded components use NDT to check for cracks.		✓	13.5
5.	Self weight test stillage lifting features		✓	13.4
6.	Proof load test stillage lifting features. (repaired/new untested components only)		✓	13.4 13.5

Table 4: S2 Stillage lifting features

## 11 SQEP Requirements

All personnel involved in operations and maintenance activities must have received training to ensure that they meet the required competency level to perform the required tasks.

## 12 Record Requirements

Appropriate through life quality records shall be maintained for the life of the stillage. Typically but not exclusively the LQR'S shall include:

- Records of all EIM&T carried out on the packages.
- Copies of signed completed check lists for maintenance and operational activities.
- Operational and maintenance defects and difficulties and incidents.
- Records of all spares used including certification.
- References to original manufacture's LQR package shall be included if available.

## 13 Acceptance Criteria

### 13.1 Inspections

#### 13.1.1 General

The purpose of the inspection is to confirm that the stillage is fit for its intended purpose and has not sustained any significant damage. Stillages shall be in good condition free from damage, corrosion and wear which will affect safety and operational requirements. All mechanical interlocks shall be fully functional and free from excessive wear. There shall be smooth engagement of movable parts and adjustable restraints. Interlock mechanisms shall be within tolerances as detailed on the design drawings.

#### 13.1.2 Components

All components are to be in place, securely fitted and free from damage. Refer to stillage design drawings for details of all fitted components.

#### 13.1.3 Markings

All required labels/markings shall be legible and securely attached.

### 13.2 Stillage Surfaces

All surfaces shall be in good condition free from damage and corrosion. Where surfaces are painted, the paint shall be in good condition, fully adhered and not flaking. Any damage to the paint finish must be made good. Care must be taken to ensure that any labels or markings are not obliterated during any paint repair

Where operational records indicate excessive decontamination requirements, assess cause and consider possible repainting.

Where corrosion is found, clean any affected areas and touch-up the paintwork as required. The paint colour and specification shall be as detailed in the LQR's

Any repairs shall be carried out to an approved repair procedure endorsed by the Design Authority.

### 13.3 Structural members

There should be no visible mechanical damage, corrosion, deformation, change in section, or cracks evident

Cracked welds, cuts, tears, abrasion greater than 1.5 mm deep, dents greater than 15 mm, bowing or bending greater than 5 mm beyond plane are unacceptable defects which must be referred to the Design Authority, LLWR Ltd.

In particular:

- Check structural welds for signs of cracking.
- Check structural members for compliance with the above criteria.
- Visually check alignment and welding of lifting features.
- Check stillage floor structure and tie-down points for compliance with the above criteria.
- Check adjustable base end restraints

### 13.4 Lifting and tie-down features

There shall be no visible mechanical damage, corrosion, deformation or cracks evident in the structural members or welds of any lifting or tie-down features. Burrs or sharp edges shall be dressed off.

To ensure there is no wear which will have a detrimental effect when interfacing with approved lifting accessories, dimensions of lifting features shall be within tolerances as detailed on the design drawing. If this is not the case the Design Authority shall be consulted.

For self-weight testing purposes the stillage unladen weight can be used.

The stillage tie-down features (twist lock mechanism) shall be checked for excessive wear. Each twist lock mechanism should operate smoothly throughout the full 90 degrees of operation

If on visual inspection there is evidence of deterioration, damage, deformation, corrosion or after carrying out any repairs the inspector shall conduct NDT to assess defects, see Section 13.5.

### 13.5 NDT

#### 13.5.1 Magnetic Particle Inspection

Inspection shall be carried out in accordance with BS EN ISO 17638 [4] with acceptance levels in accordance with BS EN ISO 23278 [5].

Defects are not acceptable for welds associated with lifting or tie-down features. Any defects that are found shall be reported to the Design Authority for sentencing.

All personnel performing MPI shall be qualified in accordance with BS EN ISO 9712 [6], Level 2 minimum or an equivalent International Standard.

### 13.6 Bolts and Receiving Threads

#### 13.6.1 Visual inspection

Threads shall be continuous, have a full form and be free from burrs and sharp edges for their design length.



### 13.6.2 Gauge Testing

#### Male Threads

Threads shall accept 'GO' gauges for the full design length

Threads shall not accept a 'NO GO' threaded gauge any further than three full thread pitches

Threads shall accept a 'GO' calliper gauge at any point along the thread design length.

Threads shall not accept a 'NO GO' calliper gauge at any point along the thread design length.

#### Female Threads

Threads shall accept 'GO' gauges for the full design length

Threads shall not accept a 'NO GO' threaded gauge any further than three full thread pitches

### 13.7 Anti-Galling

Where appropriate, threads shall be lubricated (sparingly) using a dry film lubricant such as Rocol DFSM or equivalent.

### 13.8 Lubrication

A light coating of a proprietary grease lubricant shall be applied to the stillage locking mechanism and 'D' rings.

## 14 References

- [1] BS EN ISO 9001 Quality Management Systems – Requirements
- [2] Lifting Operations and Lifting Equipment Regulations 1998 SI2307
- [3] OM\_LLWRGR\_MECH\_00001. Packing and Handling Instruction for Type TC02 IP-2 ISO Container
- [4] BS EN ISO 17638. Non-destructive testing of welds – Magnetic particle testing
- [5] BS EN ISO 23278. Non-destructive testing of welds – Magnetic particle testing of welds – Acceptance levels
- [6] BS EN ISO 9712. Non-destructive testing – Qualification and certification of NDT personnel

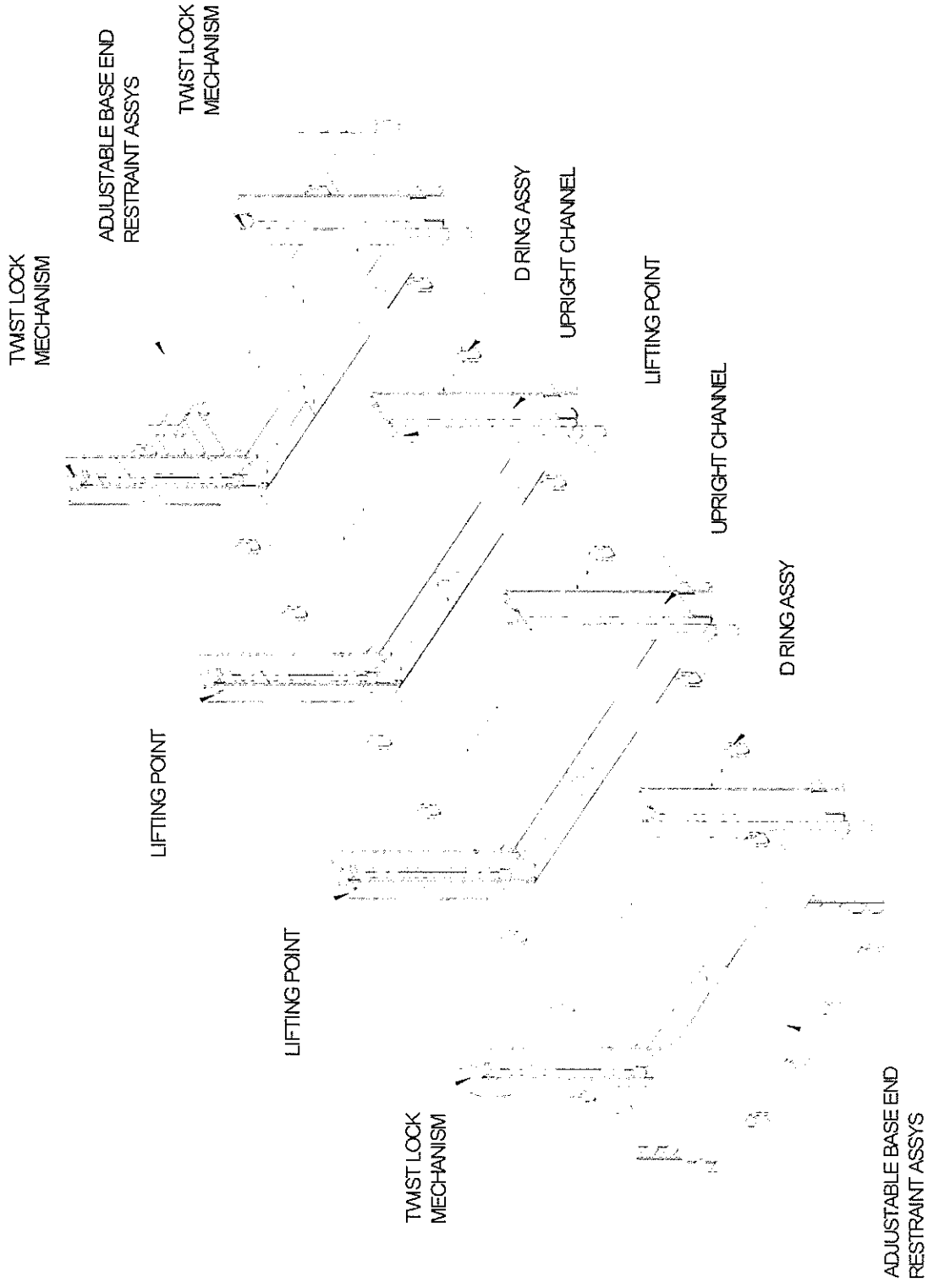


Figure 1: Type S2 stillage

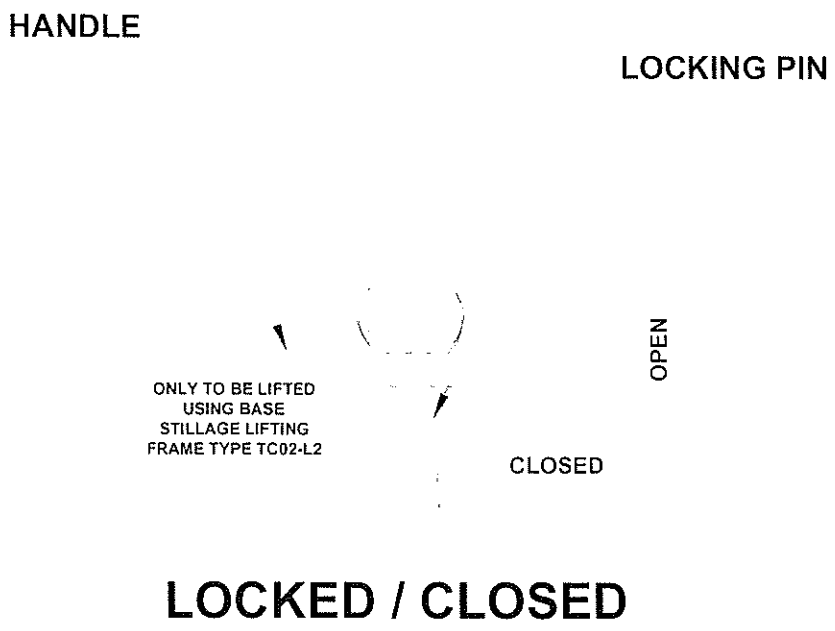
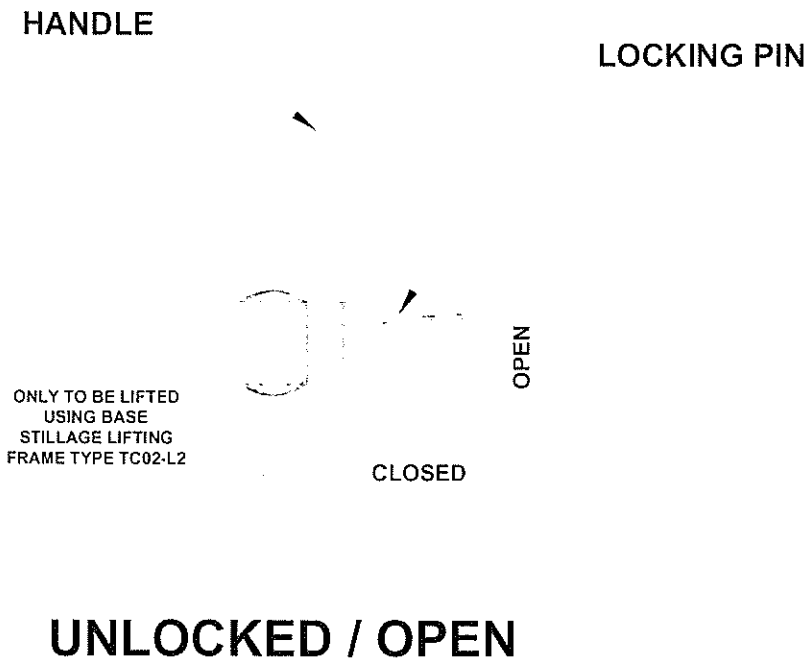


Figure 2: Stillage Locking Mechanism Positions

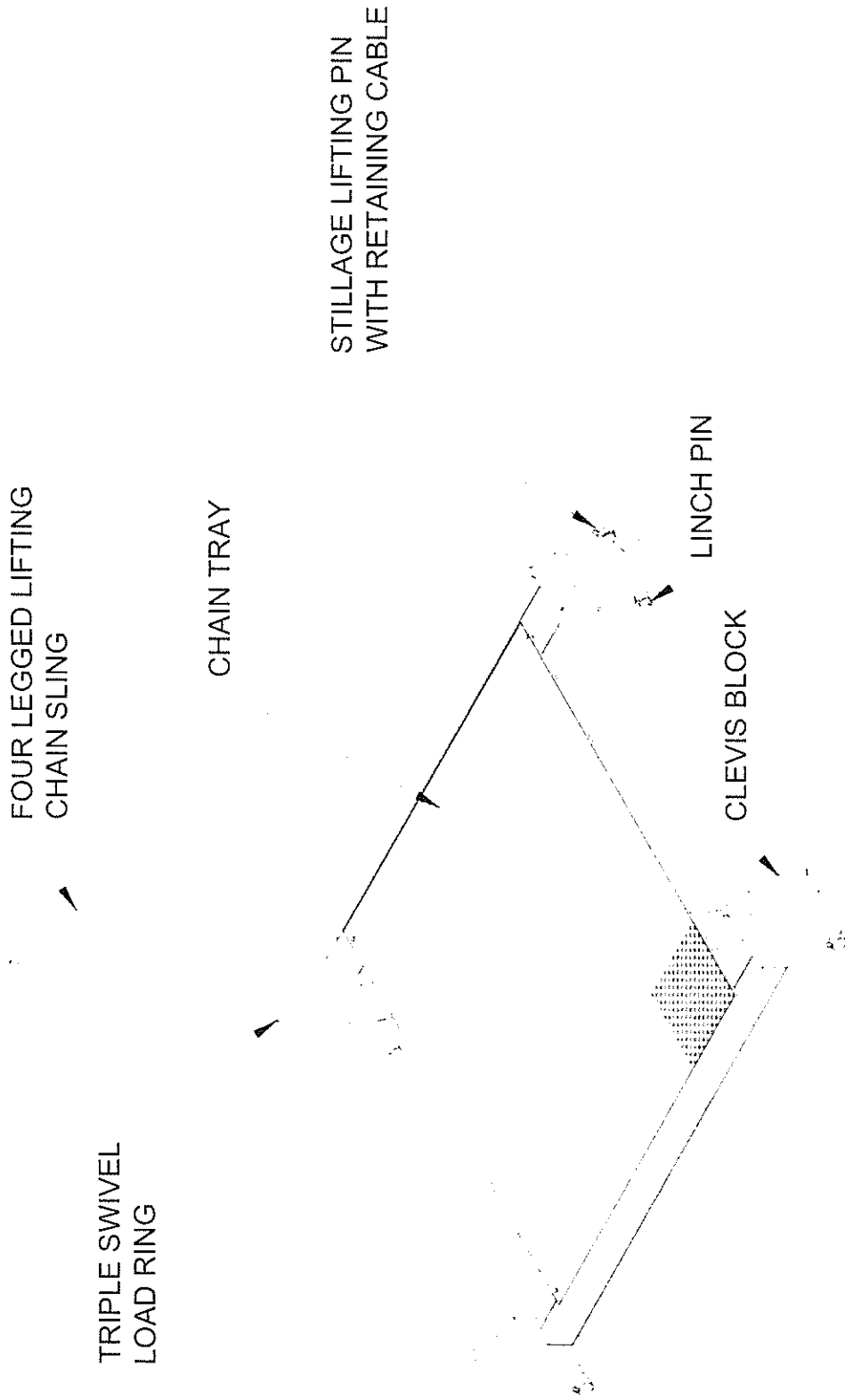


Figure 3: Type L2 lifting frame

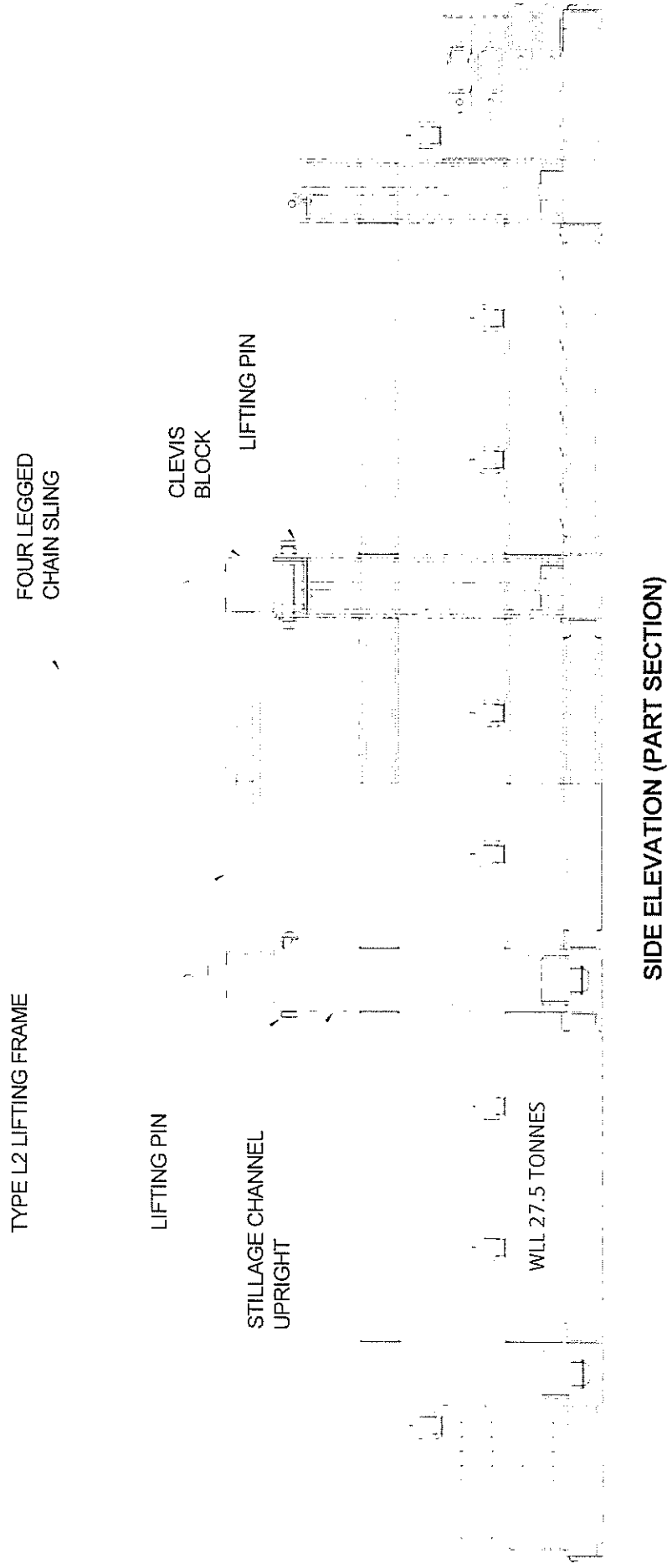


Figure 4: S2 Stillage with L2 Lifting frame engaged

Operating and Maintenance Specification for TC02 Type S2 Sillage

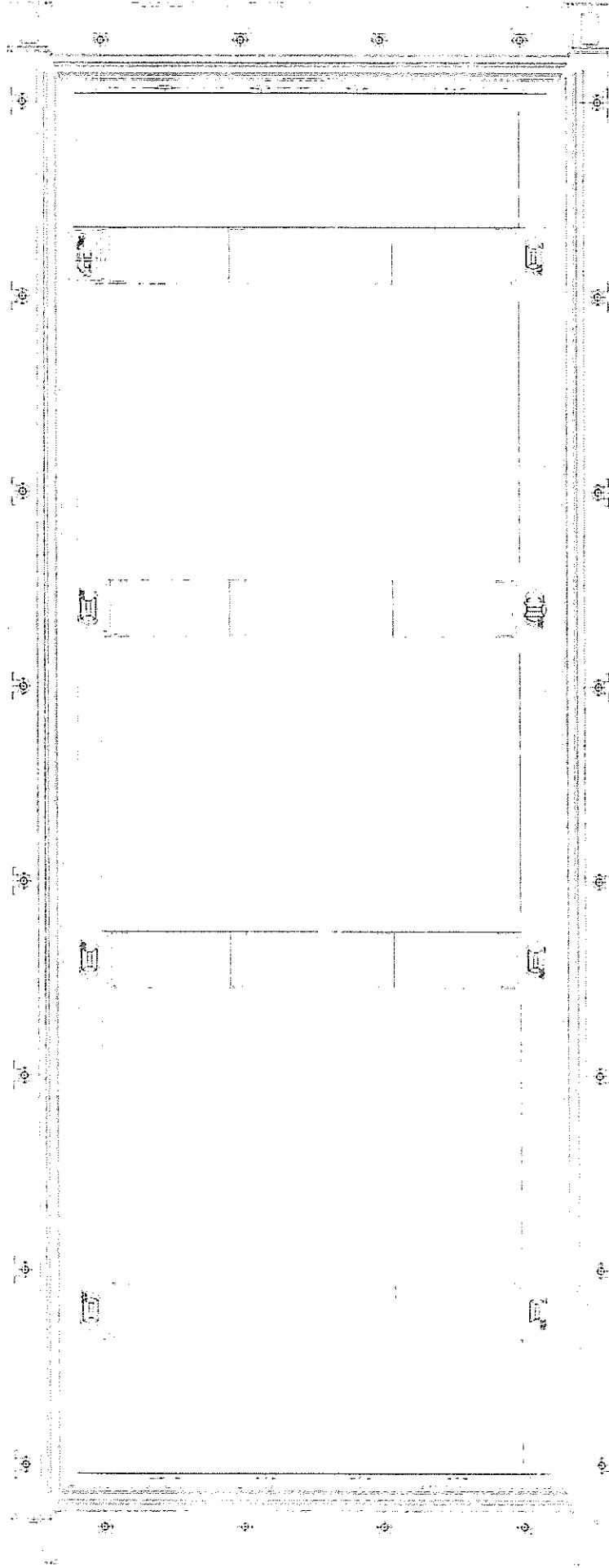


Figure 5: Layout of S2 sillage within TC02 container

## Appendix A: Stillage Specification

<b>Drawings</b>	
S2 Stillage General Arrgt	BE 2688275
S2 Stillage Parts List	BE 2688276
L2 Lifting Frame General Arrgt	BE 2697822
L2 Lifting Frame Parts List	BE 2697821
<b>Indicative Weights (kgs)</b>	
Stillage	2500
Permissible Gross Weight	30000
L2 Lifting Frame	358
L2 Lifting Frame Fork Lift Adapter	479
<b>Indicative External Dimensions:</b>	
Length (mm)	5385
Width (mm)	1950
Height (mm)	1065
<b>Load Space Dimensions:</b>	
Length (mm)	5060
Width (mm)	1680
Height (mm)	930

