Hunter Water Corporation  A.B.N. 46 228 513 446

Standard Technical Specification for:

STS 640
LIFTING EQUIPMENT

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Standard – STS 640 LIFTING EQUIPMENT

1 Purpose

This standard technical specification (STS 640) details the mechanical requirements of Hunter Water Corporation (Hunter Water) for design, manufacture, procurement, installation, and modification of lifting equipment.

STS 640 Lifting Equipment complements the mechanical requirements in specific equipment-type and facility-type standard technical specifications and facility design manuals issued by Hunter Water.


1.1 Scope

STS 640 Lifting Equipment applies to the design, supply, installation, modification, removal, and disposal of fixed asset lifting equipment that is to be owned or controlled by Hunter Water.

Lifting equipment includes:

- fixed location cranes, hoists and winches
- fixed or permanently installed lifting attachments, such as shackles, slings and chains
- lifting devices, such as C-hooks, clamps, lifting beams, lifting forks and vacuum lifters.

STS 640 addresses:

- general requirements applicable to all fixed location lifting equipment supplied to Hunter Water, including statutory and regulatory compliance
- specific Hunter Water requirements for various types of lifting equipment.

Note that this STS does not address:

- personnel lifting equipment such as used for height safety, e.g. personnel davits
- mobile cranes, see AS 1418.5-2013 based on the European standard EN 13000:2010, and AS 2550.5
- earthmoving equipment used as a crane, see AS 1418.8
- mobile elevating work platforms, see AS 1418.10
- vehicle-loading cranes, see AS 1418.11
- mobile equipment or portable lifting gear including slings and shackles, jib cranes on trucks
- portable beam clamps, trolleys and hoists on maintenance vehicles
- general slings and chains that are not fixed/permanently installed.

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Version 1 authorised by Darren Cleary on 1/03/2018
2 Interpretation

For the purposes of interpretation of this STS 640, except where the context requires otherwise:

- 'drawings' means the drawings detailing the work involved in a particular project in hand
- ‘include’ means including but not limited to, and is used to provide clarification or examples of the type and nature of items intended
- 'specification' means a specification detailing the work involved in a particular project
- ‘standards’ means applicable industry standards including the Australian Standards (AS), Australian/New Zealand Standards (AS/NZS), American National Standards Institute (ANSI), American Society of Mechanical Engineers (ASME) and ISO Standards (ISO) referenced in Appendix A
- 'standard drawings' means Hunter Water Corporation drawings
- 'standard technical specification' (STS) refers to any of Hunter Water’s standard technical specifications, as implied by the text.

Headings are for the convenience of the reader and shall not be used in the interpretation of this standard technical specification.

Unless stated otherwise, any expression such as "give notice", "submit", "approval", or "directed" means give notice to, submit to, approval by, or directed by the person nominated by Hunter Water.

Approval does not imply acceptance of responsibility by Hunter Water for compliance with this technical specification. Unless approval has been issued in writing, approval has not been granted.

2.1 Order of precedence

All work shall meet all stated requirements in this STS in addition to project specifications or standards specified.

Any deviation from this STS shall be approved in writing on a case by case basis by Hunter Water’s Document Owner.
3 Roles and responsibilities

3.1 Document Owner

The Document Owner of STS 640 Lifting Equipment is Hunter Water’s Manager Strategic Asset Planning.

3.2 Responsibilities

The Document Owner shall approve in writing the issue of any updated version of STS 640. Any concession to any requirement in STS 640 Lifting Equipment is valid only when authorised in writing by the Document Owner.
4 Definitions

4.1 STS terms

Where the following term, abbreviation or expression occurs in this STS, it is defined as follows, unless the context implies otherwise.

<table>
<thead>
<tr>
<th>Term / Abbreviation / Expression</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS</td>
<td>Australian Standard</td>
</tr>
<tr>
<td>AS/NZS</td>
<td>Australian and New Zealand Standard</td>
</tr>
<tr>
<td>Competent person</td>
<td>A person who has acquired through training, qualification, experience or a combination of these, the knowledge and skill enabling that person to correctly perform the required task</td>
</tr>
<tr>
<td>Davit</td>
<td>A manual jib crane with maximum rated capacity less than 1 tonne and that is fitted with a hoisting winch mechanism connected to the point of lifting via a pulley, excluding equipment designed to lift personnel</td>
</tr>
<tr>
<td>Design life</td>
<td>The planned life, in years, from commissioning to disposal, including any planned overhaul, as required. See AS 1418</td>
</tr>
<tr>
<td>Hunter Water</td>
<td>Hunter Water Corporation</td>
</tr>
</tbody>
</table>

4.2 Crane terms

<table>
<thead>
<tr>
<th>Term / Abbreviation / Expression</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bridge crane (or overhead travelling crane)</td>
<td>A crane comprising a bridge beam or beams mounted to carriages at each end, capable of travelling along elevated runways and having one or more hoisting mechanisms arranged across the bridge</td>
</tr>
<tr>
<td>Chain block</td>
<td>A type of serial hoist. An appliance for manual hoisting of a load suspended from a link chain</td>
</tr>
<tr>
<td>Chain hoist</td>
<td>A powered appliance for hoisting of a load suspended from a link chain</td>
</tr>
<tr>
<td>Crane</td>
<td>An appliance intended for raising or lowering a load and moving it horizontally, but does not include an industrial lift truck, earthmoving machinery, an amusement structure, a tractor, an industrial robot, a conveyor, a suspended scaffold or a lift</td>
</tr>
<tr>
<td>Drum winch</td>
<td>A winch which provides pulling force and motion by means of a wire or fibre rope stored on a drum</td>
</tr>
<tr>
<td>Gantry crane</td>
<td>A crane comprising a bridge beam or beams, which are supported at one or both ends by legs mounted to end carriages, capable of travelling along runways, and has one or more hoisting mechanisms</td>
</tr>
</tbody>
</table>
| Hoist                            | An appliance intended for raising and lowering a load or people,
<table>
<thead>
<tr>
<th>Term / Abbreviation / Expression</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>vertically and without slewing which includes a mast climbing work platform, personnel and materials hoist, scaffolding hoist and serial hoist but does not include a lift or building maintenance equipment</td>
<td></td>
</tr>
<tr>
<td>Jib</td>
<td>A member, attached to the crane structure, from which the load is suspended and which is not capable of being luffed while the crane is handling a load</td>
</tr>
<tr>
<td>Luff</td>
<td>Angular movement, of a crane boom or jib, in a vertical plane</td>
</tr>
<tr>
<td>Monorail beam</td>
<td>A beam designed to support hoists or other lifting equipment rolling directly on its bottom flange</td>
</tr>
<tr>
<td>Monorail crane</td>
<td>A crane comprising a monorail beam fixed in location, from which is supported a hoist and trolley to enable travelling beneath the monorail beam</td>
</tr>
<tr>
<td>Pendant</td>
<td>A suspended device for controlling crane or hoist motions</td>
</tr>
<tr>
<td>Power-operated wire rope hoist</td>
<td>A hoist, power-operated by means of an electric, hydraulic, pneumatic motor or the like, connected to a rope-winding drum, intended for the hoisting of a load suspended from a wire rope</td>
</tr>
<tr>
<td>Push trolley</td>
<td>A trolley capable of holding a suspended load that can be moved manually by applying a horizontal force to the trolley, suspended serial hoist hook or load</td>
</tr>
<tr>
<td>Serial hoist</td>
<td>A mass-produced hoist, usually equipped with a hook, attached to the hoist by means of a rope or chain, for attachment of its load. Serial hoists include manually operated chain hoists (chain blocks or lever hoists), power-operated chain hoists (electric chain hoists), power-operated wire rope hoists, scaffolding hoists, creeper winches, manually operated drum winches, power-operated drum winches, trolleys</td>
</tr>
<tr>
<td>Slew</td>
<td>Angular movement of a crane boom or crane jib in a horizontal plane</td>
</tr>
<tr>
<td>Trolley</td>
<td>A wheeled mechanism intended to support a hoist and capable of travelling along a suspended track, such as a monorail jib or monorail beam</td>
</tr>
<tr>
<td>Wire rope hoist</td>
<td>An appliance for hoisting a load suspended from a wire rope (see also serial hoist)</td>
</tr>
<tr>
<td>Winch</td>
<td>A device operated manually or by power and comprised of a rope and winding drum or load chain wheel for the purpose of providing a haulage or pulling force i.e. horizontal movement</td>
</tr>
</tbody>
</table>
5 General lifting equipment requirements

5.1 Legislation, codes of practice and Australian Standards

Lifting equipment shall comply with all relevant legislative requirements, codes of practice, and Australian Standards, whether referred to in this STS or not.

5.2 Fit for purpose

All lifting equipment shall be fit for purpose and for the service for where and how it is planned to be operated. Lifting equipment shall be designed to remain fit for purpose and fit for service for the estimated usage and the full design life of the equipment. Designs and materials shall be appropriate for the operating environment, including any fluids the equipment may come into contact with.

Unless otherwise specified, the design life for any lifting equipment shall be 25 years or greater.

5.3 Existing lifting equipment infrastructure

Where new or modified lifting equipment involves utilisation of any part of an existing installation for the lifting equipment to operate safely, retained components shall be first confirmed as fit for purpose for a design life equal to the design life of the new or modified equipment. Hunter Water shall be notified immediately wherever further works are required in order to meet this requirement.

5.1 Commissioning

Prior to commissioning of equipment following installation, lifting equipment shall be tested in accordance with the requirements of the relevant Australian Standards.

All lifting equipment shall be commissioned in accordance with the requirements of STS 600 General Mechanical Requirements.

5.2 Decommissioning and disposal

Any lifting equipment being disposed of shall be made unusable and scrapped. Lifting equipment shall not be sold second hand as usable/operable equipment to any parties.

5.3 Training

Any specific skills and/or training that is required to install, operate, maintain or decommission the lifting equipment shall be identified.

Where the training is specific to the equipment supplied, unless otherwise specified, on-site operator training shall be provided by the lifting equipment supplier for up to 10 personnel nominated by Hunter Water. Where training is required, training manuals shall be provided by the supplier of the equipment prior to commissioning.
5.4 Documentation

In addition to the documentation requirements specified in Hunter Water's STS 904, the Contractor shall provide to Hunter Water, as the lifting equipment owner and operator, all necessary documentation in accordance with WHS Regulation 2011 and all Australian Standards to which the lifting equipment is designed/manufactured, prior to commissioning. The following test certificates shall be provided to Hunter Water:

- a load test certificate as per AS 1418.2, Section 1.13 for power operated hoists
- a load test certificate that meets the requirements of AS 1418.3, for all bridge cranes.
6 Cranes including hoists and winches

6.1 General requirements for all cranes and hoists

This subsection details requirements that apply to all cranes, hoists and winches within the scope of this STS.

6.1.1 Design, manufacture and installation requirements

All cranes, hoists and winches shall be designed, manufactured and tested in accordance with AS 1418.1 Cranes, hoists and winches – General requirements and also with any other relevant parts of the AS 1418 series of Australian Standards.

Cranes, hoists and winches supplied to Hunter Water shall be class C3/M3 as per AS 1418.1 Cranes, hoists and winches – General requirements as a minimum, or higher if appropriate for the expected usage or if otherwise specified.

All cranes and hoists shall:

- be supplied with wire rope or chain length sufficient to reach to 0-200 mm above the lowest floor below the hoist, unless otherwise specified
- be designed and installed for a vertical lift only unless otherwise stated in the project specification
- be fitted with a safety catch on the hook.

Lifting equipment components shall be designed for operating in the environment in which the equipment is to be installed, including, as required:

- materials, including fasteners
- protective coatings
- protective enclosures on motors, brakes and power control units
- seals on motors, brakes, bearings and other moving parts
- all relevant signage.

For manual, chain-operated cranes:

- hoist hand chains and geared-drive, trolley and bridge travel chains shall be suspended below the crane to 1.0 m above the operating floor
- all mechanisms installed for actuating horizontal movement shall be designed to allow a hoist carrying the design maximum load to be moved and horizontally positioned with an effort of no greater than 200 N. Geared travel mechanisms shall be provided where required in order to meet this requirement.

Any crane, hoist or winch with a maximum rated capacity of greater than 2.5 tonne or where specified in the design shall be electrically powered for all directions of movement.

All powered cranes shall:
be controlled by a wired hand held pendant control unit with an extra low voltage power supply, unless otherwise specified

be rated at IP56 or higher

be provided with anti-strain cables on any/all catenary runs.

Each crane shall have sufficient hoist and hook travel to lift the intended load(s) clear of probable obstructions and to place the load in the nominated service area or on to a suitable truck in the loading area.

6.1.2 Signage and labelling

The following signage and labelling shall be provided on all cranes, hoists and winches:

- maximum rated capacity (MRC) for all cranes, hoists and winches, clearly visible from both sides of the crane girder as applicable, or in another clearly visible appropriate location if no girder is fitted

- class, for the hoist and travel mechanisms and the structure, clearly visible from both sides of the crane girder as applicable, or in another clearly visible appropriate location if no girder is fitted. The “M” class of the hoist shall also be included on the hoist nameplate

- details of wire rope/lifting chain, included on the hoist nameplate

- labelling of any potential live power, such as on long travel collector rails

- any safety signage, as required by AS 1418 or as recommended by the designer, manufacturer, or as identified through risk assessment

- applicable north south east west (NSEW) labelling, clearly visible from both sides of the crane girder as applicable, or in another clearly visible appropriate location if no girder is fitted

- the designated Hunter Water plant number, clearly visible from both sides of the crane girder as applicable, or in another clearly visible appropriate location if no girder is fitted.

All signage and labelling shall be sized so it is easily readable from anywhere within the operation area of the crane.

6.1.3 Electronic documentation

All cranes, hoists and winches including davits and jib cranes shall be supplied with documentation which complies with AS 1418.1: Cranes, hoists and winches – General requirements.

The following documentation shall be submitted in electronic format to Hunter Water for all cranes, hoists and winches supplied, installed or modified:

- a single page data sheet titled “<Crane/hoist/winch description> – <Hunter Water plant number> crane data sheet” including the following information:
  - Hunter Water equipment reference number
  - manufacturer’s name

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- model
- crane type (using AS 2549 Cranes (including hoists and winches) – Glossary of terms)
- serial number
- date of manufacture
- installation/commissioning date
- class – design duty crane classifications for all applicable components including structure, end carriages, bridge, trolley, hoist etc (applicable C, M and S ratings as per AS 1418.1: Cranes, hoists and winches – General requirements)
- design life, in years
- warranty period
- maximum rated capacity (MRC) in kilograms (if less than 1 tonne) or tonnes
- estimated usage per year (e.g. average two lifts per year at 1.7 tonne)
- a table summarising all recommended inspection and maintenance activities, and the initial recommended frequency for each
- design registration number (if applicable)

- pre-start checklist recommendations specific to the installed crane, hoist or winch, that meets the requirements of AS 2550.1: Cranes, hoists and winches – Safe use – General requirements, Section 7 Maintenance, Inspection and Repair, clause 7.3.2, Pre-operation inspection
- operator’s manual that meets the requirements of AS 2550.1: Cranes, hoists and winches – Safe use – General requirements, Section 6 Operation, and other applicable parts of AS 2550 series Australian Standards
- maintenance manual. Specific inclusions for documentation of maintenance requirements include:
  - a preventative maintenance program for the crane, hoist or winch based on the operating environment and proposed duty cycle
  - a routine inspection schedule and associated written instructions, which comply with AS 2550.1: Cranes, hoists and winches – Safe use – General requirements, Section 7 Maintenance, Inspection and Repair, clause 7.3.3, Routine inspection
  - any recommended periodic third-party inspection program based on the operating environment and proposed duty cycle
  - recommended inspection program for any crane runways or monorails based on the operating environment and proposed duty cycle
- a list of recommended skills, licences and certificates for the tasks relating to using, operating and maintaining any installed lifting equipment
- the pre-commissioning inspection report as per Section 6.1.4 if applicable
• all other electronic documentation as specified in Hunter Water’s STS 906 Operation and Maintenance Manual Requirements
• any registration certificates with SafeWork NSW, where required by the Compliance and Regulatory requirements (see Section 0).

All relevant documentation shall be provided to Hunter Water prior to commissioning.

6.1.4 Site document storage

For all cranes, hoists or winches installed either under a roof, or outdoors with maximum rated capacity greater than 500 kg, a document storage container shall be fixed on a wall (or similar) in the vicinity of the operator’s position. For powered cranes, hoists or winches the document container shall be installed beside the crane’s isolation switch.

The following documents shall be provided in hard copy in the document container:

• a log book for the crane, hoist or winch
• a set of pre-start checklist forms, specific to the installed crane, hoist or winch, that meet the requirements of AS 2550.1: Cranes, hoists and winches – Safe use – General requirements. The pre-start checklist forms shall be provided in a booklet, with enough entries to last 12 months of operation
• an operation and maintenance manual that meets the requirements of AS 1418.1: Cranes, hoists and winches – General requirements.

The container shall provide dry, dust-free storage for these documents in the installed location, taking into account any local wet, dusty or corrosive environmental conditions. This container shall be clearly labelled “Crane Documents and Log Books” with additional labelling to identify which crane, hoist or winch to which it belongs.

6.1.5 Commissioning

Prior to commissioning of any new electrically powered crane, hoist or winch with a 2000 kg capacity or greater, a pre-commissioning inspection shall be completed by an independent competent person such as a specialist crane engineer. The competent person shall be independent from the crane, hoist or winch supply company. The inspection shall check the installation against legislative requirements and relevant parts of Australian Standards AS 1418 series and AS 2550 series, and also review the recommended maintenance for the expected duty and operating environment. Any design/supply documentation required for the inspection shall be made available to the competent person as required. A report detailing the findings of the inspection and review shall be submitted to Hunter Water for review prior to the lifting equipment being commissioned.

All cranes, hoists and winches shall be installed and commissioned in accordance with AS 2550.1: Cranes, hoists and winches – Safe use – General requirements.

6.2 Serial hoists and winches

This subsection applies specifically to serial hoists and winches.
All serial hoists and winches shall comply with the requirements of AS 1418.2: Cranes (including hoists and winches) – Serial hoists and winches.

All serial electric chain hoists shall be fitted with hot-dipped galvanised steel chain-buckets, or suitable robust plastic chain holders, attached to the trolleys or hoists to collect hoist chains. The buckets shall be self-draining.

6.3 Bridge, gantry, portal, monorail and jib cranes

This subsection applies specifically to bridge, gantry, portal, monorail and jib cranes.

All bridge, gantry, portal, monorail and jib cranes shall:

- comply with the requirements of AS 1418.3: Cranes, hoists and winches – Bridge, gantry, portal (including container cranes) and jib cranes
- be fitted with double-flanged wheels for any long or cross travel mechanisms that run on runway rails (does not include monorails)
- be fitted with single-flanged wheels for any underslung travel mechanisms that run on monorails.

The design, supply, and installation of all bridge, gantry, portal, monorail and jib cranes shall also comply with the requirements of the following sections of AS 2550.3: Cranes, hoists and winches – Safe use – Bridge, gantry, portal (including container cranes), jib and monorail cranes:

- Section 2 – Planning
- Section 3 – Selection
- Section 4 – Siting
- Section 5 – Erection and Dismantling.

In addition to the normal working guidance systems (e.g. wheel flanges on rails), all cranes that run on runway rails or are underslung from monorails, shall be fitted with appropriate backup anti-derailment devices to prevent excessive lateral movement for both long and cross travel movements, and anti-drop devices to prevent the crane from falling more than 25 mm. Excessive lateral movement is defined as when either of the following conditions is not met:

- for underslung carriages and crabs, each wheel must maintain at least one third of its normal bearing but no less than 10 mm
- for long travel and top-running carriages and crabs, the wheel must cover at least two thirds of the rail head width.

Access for maintenance of the hoists, trolley and long travel carriages shall be provided by either permanent platforms or by ensuring there is unobstructed space beneath the parking area for the crane for an elevated work platform to stand. The specific means of achieving this shall be as specified in the project design.
6.4 Crane runways and monorails

All crane runways and monorails shall comply with the requirements of \textit{AS 1418.18: Cranes, hoists and winches – Crane runways and monorails}.

6.5 Permanent davits

All davits shall be installed with:

- a fully enclosed winching/brake system to eliminate safety hazards (i.e. pinch points) for the operator from this system
- associated wire rope, sheaves, hooks, handles and all fixings
- a brake that prevents uncontrolled lowering of the load, e.g. ratchet or similar.

The davit shall raise/lower the equipment from its installed position and slew to a service area (ground or platform) where the equipment can be readily inspected, serviced or transported to a loading bay.

Unless the site specified design requires an alternative material, permanent davits shall be constructed from:

- stainless steel grade 316, for applications within a wastewater treatment facility, within 2 km of the coast, or where the rope is designed to be submerged in water or wastewater for periods of time; or
- either stainless steel grade 316 or galvanised steel for other outdoors areas where not submerged in any liquid.
7 Permanent lifting attachments

For the purpose of this STS 640, the requirements for lifting attachments only apply to those attachments permanently attached to fixed assets such as submersible pumps and mixers, and include shackles, slings, lifting chains, turnbuckles and other similar lifting attachments.

Any lifting attachment permanently attached to a crane is considered part of the crane and shall meet the requirements specified for the crane.

Permanent attachments associated with mobile equipment are excluded.

All lifting attachments shall comply with the relevant Australian Standards, such as the following.

<table>
<thead>
<tr>
<th>Standard Number</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS 1438-1998</td>
<td>Wire-coil flat slings</td>
</tr>
<tr>
<td>AS 1666-2009</td>
<td>Wire-rope slings</td>
</tr>
<tr>
<td>AS 2321-2006</td>
<td>Short-link chain for lifting purposes</td>
</tr>
<tr>
<td>AS 4797-2009</td>
<td>Stainless steel chain for lifting purposes</td>
</tr>
<tr>
<td>AS 2741-2002</td>
<td>Shackles</td>
</tr>
<tr>
<td>AS 2759-2004</td>
<td>Steel wire rope – Use, operation and maintenance</td>
</tr>
<tr>
<td>AS 3585-2008</td>
<td>End fittings for synthetic flat-webbing and round slings</td>
</tr>
<tr>
<td>AS 3775-2004</td>
<td>Chain slings – Grade T</td>
</tr>
</tbody>
</table>

Maintenance manuals shall state the frequency and scope of maintenance and inspection activities required for any permanent lifting attachment, compliant with the requirements of the relevant Australian Standard.
8 Lifting devices

This section includes specific requirements for lifting devices including such items as:

- spreaders
- C-hooks
- clamps
- lifting beams
- lifting forks (extensions)
- vacuum lifters.

All lifting devices shall comply with AS 4991: Lifting devices.

Maintenance manuals shall state the frequency and scope of maintenance and inspection activities required for any lifting device, compliant with the requirements of AS 4991: Lifting devices.
9 Related documents

In addition to the requirements listed in this document, all work shall comply with relevant current standards and regulations inclusive of all amendments. In particular:

- Hunter Water’s STS 600 – General Mechanical Requirements
- all other current Hunter Water standard technical specifications that are applicable to the lifting equipment being installed
- Hunter Water’s standard drawings
- the Australian Standards listed in Appendix A, as applicable for specific types of lifting equipment.
10 Document control

Document Controller: Manager Strategic Asset Planning

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Author's name</th>
<th>Details of change</th>
<th>Approval date</th>
<th>Approved by</th>
<th>Next scheduled review</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>01/03/2018</td>
<td>R. Lonergan</td>
<td>Initial Release</td>
<td>01/03/2018</td>
<td>D. Cleary</td>
<td>01/03/2020</td>
</tr>
</tbody>
</table>
### Appendix A: Standards

For clarity, where a standard has several parts and/or amendments and/or supplements, the reference number is for the leading part of the standard. The standards listed below are deemed relevant to lifting equipment. This is not an exhaustive list.

<table>
<thead>
<tr>
<th>Reference Number</th>
<th>Title</th>
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