Product Manual

For

SpecTRON 45
Foreword

Thank you for purchasing a Siemens Subsea product. The information contained in this document is an overview including the protection, storage, shipment, unpacking, deployment and maintenance for Subsea SpecTRON 45 connector product range.

IMPORTANT
READ CAREFULLY BEFORE USE
KEEP FOR FUTURE REFERENCE

Revision Summary

This page records the revision status of the entire document and its authorisation for issue. When a page or pages of the document are revised, the number of the page(s) affected will be entered in the Page(s) Affected/Remarks column and a vertical margin line will appear against the latest amended text.

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<tr>
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1 PRODUCT SCOPE

This manual includes information on the following SpecTRON 45 connector types:
- SpecTRON 45 Jumpers
- SpecTRON 45 Wet Mate Pair
- SpecTRON 45 Common Module Interface
- SpecTRON 45 Shallow Water/Test Jumpers

1.1 Product specification

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEPS SP-1001</td>
<td>Power connectors, penetrators and jumper assemblies with rated voltage from 3 kV (Umax = 3,6 kV) to 30 kV (umax = 36 kV)</td>
</tr>
</tbody>
</table>

Table 1 SpecTRON 45 product specification

1.2 Contact details

For additional information or questions regarding the products visit the Siemens website [www.siemens.com/subsea](http://www.siemens.com/subsea) or contact the following:

<table>
<thead>
<tr>
<th>Department</th>
<th>E-mail address</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Safety</td>
<td><a href="mailto:subsea.connectors.productsafety.gb@siemens.com">subsea.connectors.productsafety.gb@siemens.com</a></td>
</tr>
<tr>
<td>Technical Support</td>
<td><a href="mailto:connectortechnicalsupport.gb@siemens.com">connectortechnicalsupport.gb@siemens.com</a></td>
</tr>
<tr>
<td>Installation and Servicing</td>
<td><a href="mailto:susultlcmsupport.gb@siemens.com">susultlcmsupport.gb@siemens.com</a></td>
</tr>
<tr>
<td>Sales</td>
<td><a href="mailto:connectorsales.gb@siemens.com">connectorsales.gb@siemens.com</a></td>
</tr>
</tbody>
</table>

Table 2 SpecTRON 45 product contact details
1.3  Product advice label

The following product advice label is supplied with all Siemens subsea products.

Figure 1  Product advice label

1.4  Product marking

SpecTRON 45
© Siemens
P/N: S1U10505567

Figure 2  Typical Product Marking

SpecTRON 45 products are marked with the Siemens Subsea part number and unique serial number, as well as safety critical rating information, such as voltage, maximum water depth, allowable operating temperature range, and a maximum allowable working pressure (MAWP) if appropriate. Marking is typically on a plate attached to the product, or on an accessible outside diameter of the product.

Harnesses are also marked with the Siemens Subsea part number and unique serial number as shown in Figure 2. Client and project specific information is also usually added to these labels. Labels
are typically black text on a yellow background underneath clear tape. Typically, labels are located at each end of the harness.

1.5  **CE label/marking**

SpecTRON 45 is exempt from any current requirement for CE marking. Siemens continue to monitor European and International requirements for applicability to the SpecTRON 45 product range.
2 PRODUCT SAFETY

Siemens Subsea recommends the termination of all equipment shall only be undertaken by trained, suitably qualified and experienced personnel (SQEP) i.e. competent person.

2.1 Action-related warnings

Classification of action-related warnings

The action related warnings are classified in accordance with the severity of the possible danger using the following warning signs and signal words:

**Warning symbols and signal words**

- **Danger!** Imminent danger to life or risk of severe personal injury
- **Danger!** Risk of death from electric shock
- **Warning.** Risk of minor personal injury
- **Caution.** Risk of material or environmental damage

2.2 Intended use

Following installation, commissioning and deployment of product, please complete and return the Customer Comments/Feedback form (Section 10). Please e-mail completed form to the Product Safety Officer at subsea.connectors.productsafety.gb@siemens.com.

There is a risk of injury or death to the user or others, or of damage to the product and other property in the event of improper use or use for which it is not intended.

The product is intended as a subsea high voltage electrical connector, for use by suitably trained personnel in industrial applications only.

Intended use includes the following:

- observance of the installation and operating instructions included for the product and any other system components.
- compliance with all inspection and maintenance conditions listed in the instructions.
- Use of all recommended tooling appropriate for specific tasks.
- All activities to be undertaken by a competent person (see 2.3.1 for definition).

Any other use that is not specified in this document or covered in installation and operating instructions, or beyond that specified in this document shall be considered improper use.

**Danger!** Risk of Imminent danger to life or risk of severe personal injury, through unforeseeable misuse of a SpecTRON 45 connector, if tested as a pressure barrier or pressure retaining item on a pressure vessel application, when not deployed subsea.

- All pressure testing of SpecTRON 45 product must be undertaken by a competent person.
Caution. Risk of material or environmental damage, improper use of any kind is prohibited.

2.3 General safety information

2.3.1 Installation by competent persons only
The installation, inspection, maintenance and repair of the product shall be undertaken by trained, suitably qualified and experienced personnel (SQEP) i.e. competent person, to carry out a specified activity. Installation, inspection, maintenance and repair of products by untrained and deemed non-competent persons could invalidate the product warranty.
For further information contact Service (Site Team) susultlcmsupport.gb@siemens.com.

2.3.2 Danger caused by improper operation and foreseeable misuse
Improper operation and foreseeable misuse may present a danger to you and others and cause material damage. Carefully read the enclosed instructions and all other applicable documents, particularly the “Safety” section and the warnings.

Danger! Risk of death from electric shock if user dismantles/incorrectly re-assembles/incorrectly re-terminates product (foreseeable misuse).
- Maintenance, disassembly, re-assembly and termination activities must only be carried out by a competent person.

Danger! Risk of death from electric shock if shuttle pins are depressed e.g. with a screwdriver when plug is live (foreseeable misuse).
- Maintenance and testing activities must only be carried out by a competent person.
- Correct tools must always be used.

Danger! Risk of imminent danger to life, risk of severe personal injury caused by a shuttle pin projectile due to damage caused to shuttle pins e.g. with a screwdriver (foreseeable misuse).
- Maintenance and testing activities must only be carried out by a competent person.
- Correct tools must always be used.

2.3.3 Risk of death due to electrocution

Danger! Risk of death from electric shock due to exposed live pins, e.g. factory or top-side system test and unmated receptacle is energised, e.g. by diver subsea.
- Ensure all test procedures are followed.
- Communication channels and protocols are observed.

Danger! Risk of death from electric shock due to unscreened HV cables in Jumpers.
- Ensure all test procedures are followed.

Danger! Risk of death from electric shock from any exposed conductors due to stored electrical energy, e.g. capacitance of cable or elsewhere in the system.
- Ensure all procedures are followed.
**Danger!** Risk of death from electric shock from test connectors. Live parts accessible with standard finger test, also live parts can be exposed by disassembly without a tool (e.g. termination sleeves are accessible and can be removed). Also exposed cable conductors at free end and cables unscreened.
- Ensure all connectors are assembled correctly with termination sleeves in position prior to conducting standard finger test.

**Danger!** Risk of death from electric shock if product is terminated incorrectly by 3rd party e.g. loose conductor touching metal body, or live wire terminated to metal body in error.
- Installation/termination activities must be carried out by a competent person.

**Danger!** Risk of death from electric shock due to metal body of connector not being earthed during test and connector having earth fault (e.g. conductor touching metalwork) during electrical testing.
- Ensure all testing of products both factory and deployed in-field have been completed by competent persons.

**Danger!** Risk of death from electric shock or severe personal injury through burning from de-mating live conductors by hand.
- Ensure all procedures are followed for mating/de-mating connectors.

### 2.3.4 Risk of injury and material damage due to maintenance and repairs carried out incorrectly or not at all

Maintenance work or repairs on the products should only be carried out by a competent person. Faults and damage should be immediately rectified by a competent person. Adhere to the maintenance intervals specified.

**Danger!** Risk of imminent danger to life, risk of severe personal injury from burning and material damage from ohmic heating in short-circuit condition or high over-currents.
- Ensure all testing of products both factory and deployed in-field have been completed by competent persons.

**Danger!** Risk of imminent danger to life, risk of severe personal injury caused by released pressure and or projectile due to incorrectly installed pressure retaining product, e.g. during system pressure test (e.g. SpecTRON 45 penetrator fitted with wrong/insufficient screws or seals).
- Ensure all product assembly and testing activities are completed by competent persons.

**Danger!** Risk of imminent danger to life, risk of severe personal injury to persons with pacemakers or implantable cardioverter-defibrillators (ICDS) from electromagnetic interference (EMI) e.g. high frequency testing with large load currents.
- Ensure all testing of products both factory and topside are not conducted by or in the presence of persons with pacemakers or ICDS.

**Danger!** Risk of severe personal eye injury due to pressurised oil squirting out of damaged hose or removal of fill/vent screw.

Ensure all testing of products both factory and deployed in-field have been completed by competent persons.
Warning. Risk of eye/bodily injury caused by released pressure during product disassembly, in the event of retrieval from subsea with a fault that causes depth pressure to be trapped inside the product.
- Ensure all product disassembly activities are completed by competent persons in accordance with relevant procedures and using relevant personal protective equipment (PPE).

Warning. Risk of bodily injury caused by pressure retaining parts becoming projectile due to user over-pressurising the system, e.g. during Site Installation Test (SIT).
- Ensure all product SIT activities are completed by competent persons in accordance with relevant procedures.

2.3.5 Risk of injury and material damage due to manual handling

Manual handling, lifting and carrying are known to be one of the largest contributors to occupational ill-health. Ensure mechanical handling aids are used wherever possible to avoid manual handling. Where manual handling is considered appropriate for the task, safe lifting guidelines must be followed, e.g. adopt correct posture, consider team lifting, employ safe lifting technique, etc. Only competent persons are permitted to perform tasks without supervision, if in doubt ask.

Warning. Risk of musculoskeletal injury from hand-mating connectors with high mate/de-mate force and/or connector rapidly fires out during de-mate due to high shuttle spring force, e.g. factory/topside testing.
- Ensure all product testing activities are completed by competent persons in accordance with relevant procedures.
- Ensure mechanical handling aids are used wherever possible to avoid manual handling.
- Where manual handling is considered appropriate for the task, safe lifting guidelines must be followed, e.g. adopt correct posture, consider team lifting, employ safe lifting technique, etc.

Warning. Risk of musculoskeletal injury from manual handling of heavy products.
- Ensure mechanical handling aids are used wherever possible to avoid manual handling.
- Where manual handling is considered appropriate for the task, safe lifting guidelines must be followed, e.g. adopt correct posture, consider team lifting, employ safe lifting technique, etc.
- Only competent persons are permitted to perform tasks without supervision, if in doubt ask.

Warning. Risk of bodily injury from heavy product falling during lift with machinery.
- Ensure machinery/slings used have been tested and are within their expiry date.
- Safe lifting guidelines must be followed, e.g. lifting plan, banksman, etc.
- Correct lifting points must be identified and used.
- Only competent persons are permitted to perform tasks without supervision, if in doubt ask.

Warning. Risk of minor personal injury to persons with sensitivities to silicone or synthetic ester based oils.
- Wear appropriate hand protection when handling products or silicone or synthetic ester based oils.
Warning. Risk of minor personal injury and material damage due to slips, trips and falls.
- Good housekeeping avoids slips, trips and falls, keep all work areas clean and tidy.

Warning. Risk of minor personal injury and/or material or environmental damage during assembly.
- Caution shall be exercised during assembly to ensure that fittings and hydraulic/pneumatic equipment are correctly installed.

2.4 Related documents

Installers shall carryout a full site risk assessment and put into place all necessary steps and procedures to comply with applicable area, regional, national or international health and safety legislation, e.g. The Health and Safety at Work Act (HASAWA) in the United Kingdom (UK) and ensure safety of themselves and others regarding manual handling and working at height requirements.

During the product installation (and any subsequent work) it will be necessary to employ caution. All installers and operatives involved from unloading the product until it is deployed in its final installed location must exercise a full duty of care for themselves and others regarding safety. When lifting and handling this product, operatives should employ assistance if required. In certain situations, it may be necessary to use mechanical handling aids. Take care to avoid trip hazards, slippery or wet surfaces.

Employers and installers should refer to the Health and Safety Executive (HSE) web site in the UK for full advice and manual handling assessment charts (MAC) tool.

In addition, where no specific instructions are given then reference shall be made, but not restricted to, where applicable, British Standards and codes of practice such as the following:
- The Health and Safety at Work Act.
- COSHH Control of substances hazardous to health.
- BS 7671 Requirements for electrical installations. IEE Wiring Regulations.
- The Electricity at Work Regulations.

It is the operator's and installers responsibility to comply with current Company, area, regional, national or international health and safety legislation.

Following installation, commissioning and deployment of product, please complete and return the Customer Comments/Feedback form (Section 10). Please e-mail completed form to the Product Safety Officer at subsea.connectors.productsafety.gb@siemens.com.

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3 ABBREVIATIONS

A Ampere
ac Alternating Current
Assy Assembly
BOM Bill of Material
°C Degree Celsius
CE Community European
COSHH Control of substances hazardous to health
CP Cathodic Protection
dc Direct Current
DWG Drawing
EFL Electrical Flying Leads
EMF Electrical Magnetic Field
EMI Electromagnetic Interference
FAT Factory Acceptance Test
IR Insulation Resistance
ICDS Implantable Cardioverter-Defibrillators
ISO International Organization for Standardization
ITP Inspection Test Plan
K Kelvin
LTC Long Term Cover
M Metres
Max. Maximum
MFG Manufacturer
Min. Minimum
PPE Personal Protective Equipment
ROV Remotely Operated Vehicle
SI Standard International
SIT Site Installation Test
SST Stainless Steel
TBD To Be Defined
UNS Unified Numbering System for Metals and Alloys
V Volt
4 SPECIFICATION AND RESIDUAL HAZARDS

The following is the typical specification for SpecTRON 45 connectors with 630 mm² jumper cable and will differ for connectors with different size jumper cables, connectors terminated to umbilical power cores or internal pigtails, and in other situations.

For connector specific information, please refer to product specific data sheets. These are available via the Siemens Subsea website www.siemens.com/subsea or Siemens Subsea Connectors Technical Support connectortechnicalsupport.gb@siemens.com.

4.1 Connector System Specification

<table>
<thead>
<tr>
<th>Number of ways / phases</th>
<th>1</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Water Depth</td>
<td>3 000</td>
<td>m</td>
</tr>
<tr>
<td>Maximum Differential Pressure</td>
<td>10</td>
<td>bar</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-5 to 20</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-25 to 60</td>
<td>°C</td>
</tr>
<tr>
<td>Number of Mates (Wet Mate Pair)</td>
<td>100</td>
<td>-</td>
</tr>
<tr>
<td>Rated Voltage</td>
<td>26/45(52)</td>
<td>kV</td>
</tr>
<tr>
<td>Rated Current</td>
<td>See Graph</td>
<td>-</td>
</tr>
<tr>
<td>Rated Frequency</td>
<td>5 – 200</td>
<td>Hz</td>
</tr>
</tbody>
</table>

Table 3 SpecTRON 45 connectors electrical specification
4.2 Misalignment capability of wet mate connector

For any wet mate pair, one connector must be rigidly mounted using a fixed mount kit, and the other half compliantly mounted. Siemens Subsea offer two compliant kits which differ in the amount of compliance they offer. A standard kit offers 17.5 mm total radial compliance, and an extended kit offers 35 mm total radial compliance, this relates to the allowable combined misalignments shown in the graph below for both compliant mount kits. Both kits offer a maximum of 10 mm allowable axial offset in both directions.

![Graph showing misalignment capability](image)

Table 4 SpecTRON 45 connector misalignment capability

4.3 Other specifications

For all other specifications not included in the above tables, refer to product/project specific data sheet(s), alternatively contact Technical Support connectortechnicalsupport.gb@siemens.com.
5 HEALTH AND ENVIRONMENTAL INFORMATION

5.1 Environmental, disposal and recycling
Safe disposal or recycling of waste packaging and/or end of life product is recommended by correctly, observing and complying with area, regional, national or international environmental legislation where applicable.

To return waste packaging and/or end of life product to the manufacturer, contact the Product Safety Officer at subsea.connectors.productsafety.gb@siemens.com.

Hazardous substances, Control of substances hazardous to health (COSHH) Assessments regards to materials such as elastomers and oils, etc. used in [insert product type] products are available on request from the Product Safety Officer at subsea.connectors.productsafety.gb@siemens.com.

5.2 Personal protective equipment (PPE)
Personal Protective Equipment (PPE) is legally defined as ‘all equipment (including clothing affording protection against the weather) which is intended to be worn or held by a person at work and which protects the user against one or more risks to their health or safety’.

In the hierarchy of risk control, PPE is considered to rank lowest and represent the option of last resort. PPE is only appropriate where the hazard in question cannot be totally removed or controlled in such a way that harm is unlikely (for example by isolating the hazard or reducing the risk at source to an acceptable level).

All company personnel and operators should wear appropriate Personal Protective Equipment (PPE) defined as a result of relevant risk assessments in accordance with the Personal Protective Equipment (PPE) Regulations.

Warning. Risk of minor personal injury to persons with sensitivities to silicone or synthetic based ester oils.
- Wear appropriate hand protection when handling products, silicone or synthetic based ester oils.
PREPARING PRODUCT FOR USE

6.1 Before installation

SpecTRON 45 products are manufactured primarily from materials such as 316L stainless steel and Super Duplex stainless steel, and as such are designed to withstand harsh saliferous environments. However, the connector inserts and exposed parts are susceptible to mechanical damage if not protected. Dust caps or polyethylene protective caps must be fitted to all Siemens Subsea connectors before transport.

Caution. Risk of material damage.

- Dust/protective caps must always be fitted during transport.
- It is recommended that caps remain in place until immediately prior to testing activities or deployment subsea.

Connectors can be shipped singularly or in multiples. Care should be taken to protect the connector(s) with bubble wrap or similar wrapping materials to avoid surface damage during transit. If large numbers are shipped in one consignment suitably reinforced transport box will be necessary to withstand the weight. See Figure(s) for details of transport box(es).

![Figure 3 Typical transport box for short (10 m) harness](image)

Connectors are designed to withstand vibration that occurs during transportation and to withstand being dropped from a height of 1 metre whilst in packaging.

6.2 Unpacking

Caution. Risk of material damage.

- Do not use a knife to cut the wrapping material, as this may cause damage to any elastomeric parts of the connector.
- Do not remove dust/protection caps until connectors are ready for mating
- On removal do not allow the hoses to drag over the edges of a transport box.
Remove wrapping material taking care to inspect for any surface damage or separately packed installation or spares kits which may have become separated from a connector.

6.2.1 Protective caps

All connectors come supplied with a protective cap. Protective caps (typically white in colour) are typically attached to the products as shown in the images below, with the caps indicated with a red arrow.

![Figure 4 Protective Caps on SpecTRON 45](image)

The modules below use disposable screws to attach the caps to the connector:

- Shallow Water Gland (M12 Screws)
- Umbilical Gland (M12 Screws)
- Jumper Gland (M12 Screws)
- Wet Mate Plug and Receptacle (Gland Interface, M12 Screws)
- Common Module Interface/Penetrator (M12 and/or customer specific screws)

For the front-end of the wet mate connectors, push-fit caps may be used.

6.3 Lifting

⚠️ Danger! Risk of serious personal injury or death, and material damage to product

- Connectors must only be lifted at the locations specified below.
- Never use the cable or hose to lift or support a connector gland.
- All lifting operations should be performed by suitably qualified personnel, in accordance with applicable regulations where and when the lift is performed.

The table below shows the most common modules in the SpecTRON 45 product range and their most appropriate lifting points. It is intended as a guide to correct lifting locations and to aide specification of correct lifting equipment (e.g. lifting eyes, and slings) and is not a replacement for a well-designed lifting plan.
Where a single lifting point is specified the centre of gravity is below the lifting point, and where two lifting points are specified, the centre of gravity is between the two points at a location which may vary depending on the project specific configuration of the product.

For assemblies which consist of multiple modules from the table below, use the two outer lifting points to ensure the centre of gravity is within the lifting points.

For more detailed lifting information or guidance, refer to the product datasheet and/or contact Siemens Energy technical support (connectortechnicalsupport.gb@siemens.com).

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Mass (kg) (in air)</th>
<th>Slinging</th>
<th>Comments/Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Back to back</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10” Compact Flange</td>
<td>49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Module Interface</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receptacle</td>
<td>72</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plug</td>
<td>90</td>
<td>Clamping Collar P/N: S1U10509219</td>
<td></td>
</tr>
<tr>
<td>Jumper Gland</td>
<td>88</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shallow Water Gland</td>
<td>85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Umbilical Gland</td>
<td>125</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable &amp; Hose</td>
<td></td>
<td></td>
<td>Support with sling every 5 m maximum</td>
</tr>
</tbody>
</table>
6.4 Installation and assembly

The compliant and fixed mounts for the SpecTRON 45 are shipped in the same packaging as the connectors but are not assembled to the connector.

The connectors need to be routed to their final installation position before the mounting kit is used to mount the connector to the module panel or mating head. There is no requirement for alignment between the connector and the module panel/mating head as the compliant and fixed mount can be attached in any possible alignment using the 15-bolt pattern to avoid rotational strain in the jumper.

Danger! Risk of serious personal injury or death, and material damage to product
- Only use fasteners and equipment provided by Siemens as part of installation kit
- Connectors must only be lifted at the locations specified previously
- Never use the cable or hose to lift or support a connector gland.
- All lifting operations should be performed by suitably qualified personnel, in accordance with applicable regulations where and when the lift is performed.
- Do not remove the lifting equipment supporting the connector until the mounting is fully assembled, including torqueing.

6.4.1 Compliant Mount (Standard and Extended) Assembly

To assemble the compliant mount onto the connector:

1. Verify the correct spacing of the compliant mount points against Siemens drawing 00029936, ensuring that the hole pattern used matches the compliant mount kit supplied.

2. Route the connector through the module and to the mounting point

3. Attach the compliant mount arms to the connector using the M10 screws and the M10 Nord-Lock washers. Tighten to a torque of 60 Nm.
4. Bring the connector with the arms to the plate.

5. Thread the bobbins onto the arms

6. Secure the bobbins to the mounting plate using 3 socket head cap screws and M12 Nord-Lock washers, tighten to a torque of 100 Nm.
7. Verify that all fasteners are correctly tightened.

Danger! Risk of serious personal injury or death, and material damage to product
- The connector will drop to the lowest position possible when the lifting equipment and support is removed, this is intended behaviour of the compliant mount.
- Ensure all fasteners are properly tightened before removing any lifting equipment or supports.
- Remove the lifting equipment and supports slowly to ensure that there is no sudden movement of the connector.

8. Verify that the connector, hose and compliant mount are properly assembled and that they can move freely within the mating head.

6.4.2 Fixed Mount Assembly
To assemble the fixed mount onto the connector:
1. Verify the correct spacing of the fixed mount points against Siemens drawing 00029937.
2. Route the connector through the module and to the mounting point
3. Align the fixed mount segments with the connector flange and attach the fixed mount segments to the connector flange using 5 x M10 screws and Nord-Lock washers. Tighten to a torque of 60 Nm.

4. Repeat for all three segments and lower the connector back onto the mounting face.

5. Attach the fixed mount flanges to the mounting face with 12 x M12 screws and Nord-Lock washers, tighten to a torque of 100 Nm.

6. Verify that all fasteners are correctly tightened before slowly releasing any supports and/or lifting equipment.
6.5  **Storage and protection during intervals of normal use**

**Caution.** Risk of corrosion to electrical contacts.

- If the connector has been tested in a wet environment, mate receptacle to a full dummy plug, or if using an Acetal protective cap ensure that the pin and cap are completely dry
- If storage is carried out in high humidity or salinity conditions, e.g. on a ship’s deck or hold, or near a dockside, then full dummy connectors should be used.

**Caution.** Risk of material damage.

- Connector surface temperature must not exceed 60°C, maximum storage temperature accounts for solar gain.
- Suitable protection must be used to ensure maximum storage temperature is not exceeded.

**Caution.** Risk of material damage.

- Connectors should not be allowed to encounter solvents, oil, grease or other semi-solid materials.

6.5.1 **Short term connector storage**

Prior to installation the connectors are sensitive to environments where grit and dirt are present. To prevent ingress of the above, they should be stored in a clean dry area and be protected by bubble wrap or similar wrapping material. Dust/protective caps must be fitted.

6.5.2 **Long term connector storage**

Connectors must be stored in a clean dry area. Suitable protection caps must be fitted and the storage temperature should be between -25°C and 60°C. Humidity of the storage room should be between 10% and 60%. The equipment should be protected from ozone, strong sunlight and strong artificial light with a high ultraviolet content.

6.5.3 **Long term storage of elastomers**

For the recommended storage of elastomeric components e.g. termination sleeves and cable boots, please refer to Siemens Subsea Document MH006 – Procedure for Storage and Handling of Elastomeric Materials.

6.5.4 **Subsea Storage**

**Caution.** Risk of corrosion to electrical contacts.

- In a subsea environment the receptacle connector must be mated to full dummy plug or subsea rated protective cap when not mated to a plug.
- Over the life of the connector, the receptacle pin contact cannot be left exposed for more than 28 days cumulatively.

If the connectors are to be left unmated in seawater dummy connectors or subsea protective cap must be used to protect the pin contacts in the receptacle connectors. Over exposure will increase the risk of corrosion damage or marine growth on the contact surfaces of the receptacle contact pins. This could lead to damage to the seals and insulation within the socket contacts.
6.6 Safe disposal of packaging
Dispose of the packaging correctly, observing and complying with area, regional, national or international environmental legislation. Where possible recycle responsibly.

To return waste packaging to the manufacturer, contact the Product Safety Officer at subsea.connectors.productsafty.gb@siemens.com.

6.7 Repackaging to prevent damage in transport
In the event of a requirement to return any product back to the manufacturer (Siemens Subsea Connectors), it is recommended that a dust/protective cap is fitted to the connector(s). It is recommended that a suitably reinforced box be used to withstand the weight and allow shipping in one consignment. Contact Technical Support connectortechnicalsupport.gb@siemens.com to discuss details of typical boxes.
7 OPERATION OF PRODUCT

7.1 Energising Wet Mate Pair

Danger! Risk of death from electric shock.
- Connectors must not be de-mated whilst live.
- Allow sufficient time for system to discharge any residual voltage to discharge before de-mating connectors
- Connectors must be fully mated before energisation
- Receptacles must not be energised unless mated to a plug

Caution. Risk of material damage.
- Connectors must not be de-mated whilst live.
- Allow sufficient time for system to discharge any residual voltage to discharge before de-mating connectors
- Connectors must be fully mated before energisation
- Receptacles must not be energised unless mated to a plug

SpecTRON 45 connectors should be integrated and managed as part of a well-designed high voltage system with appropriate validation of system status and connections before energisation.

When performing high-voltage testing of an electrical system containing SpecTRON 45, Siemens offer appropriate test equipment which can be used to provide safe termination of wet-mate and dry-mate connectors. Product marking on the test equipment must be verified to ensure that they are appropriately rated.

7.2 Connecting Wet Mate Pair Subsea

Caution. Risk of material damage.
- Any mating equipment used to mate the SpecTRON 45 must be designed in accordance with the misalignment and interface guidance provided by Siemens Subsea to avoid damage to the connector pair.

Warning. Risk of injury from trapping of limbs in mating tools
- Any mating equipment used to mate the SpecTRON 45 connector pairs should be in compliance with applicable standards and regulations for machinery.

The SpecTRON 45 wet mate pair cannot be mated subsea without specialised mating and locking equipment (mating tool).
7.3 Temporary Connection of Wet Mate Pair

**Warning.** Risk of musculoskeletal injury from mating heavy connectors

- Connectors should always be moved using appropriate lifting equipment and methods
- During mating of the connectors, the hose and cable should be supported so that they do not induce unforeseen movement or strain in the connectors.
- Only use equipment and procedures specified by Siemens.

For connection of a wet mate pair in a test or workshop environment without a separate subsea mating tool, Siemens offer a mating kit (S1U10509597) which allows the connectors to be mated using simple tooling in a safe manner using standard bar clamps (e.g. Irwin Quick-Grip) (600 mm clamping length) which can be purchased separately.

7.3.1 Mating the connectors

1. Attach mating lugs/ears to the two connector halves using the M12 bolts

2. Lift the connectors onto the supports
3. Align the two connector halves and engage the plug into the receptacle

4. Use clamps to drive the two connector halves together. When the receptacle hits the plug nose support, remove it.

5. Continue to use the two clamps to draw the connectors together until the mating faces close.
6. Remove the clamps one at a time and replace with the stud iron to clamp the two connector halves together. Ensuring that the insulating sleeves are fitted to the stud and nut to isolate them from any electrical testing.
7.3.2 De-mating the connectors

1. Slowly remove the clamping rods, there should be no force pushing the connectors apart.

Use the clamps between the lugs to slowly push the connectors apart.

2. When the groove on the plug is visible, slide the plug nose support under the plug.
3. Continue to push the connectors apart with the clamps until then is an audible click as the shuttle pin disengages

4. Slide the connectors apart

7.4 Quick Connect (Dry Mate)

**Caution.** Risk of material damage.
- Siemens strongly recommend that the Quick Connect / Dry-Mate operation is only performed by Siemens or suitably certified personnel in possession of the correct equipment and documentation.

The SpecTRON 45 connector family offers a dry-mate system between the connector gland component and connector/penetrator “front-end” module.

This operation should only be carried out by Siemens or other suitability certified personnel in possession of the correct equipment and work instructions. Please contact Siemens Subsea for more information on training, certification and termination services for SpecTRON 45 provided by Siemens Subsea.
7.5 Quick references
For quick reference of the product, see 1.3 Product advice label, which provides basic warning, caution and contact details among other information.

In addition to the above, some details are also listed on the product label such as, system type, part number (P/N), serial number (S/N), electrical, pressure and temperature rating as detailed in Section 1.4.

7.6 Disposal of waste products
Safe disposal or recycling of waste/end of life product is recommended by correctly, observing and complying with area, regional, national or international environmental legislation where applicable.

To return waste packaging and/or end of life product to the manufacturer, contact the Product Safety Officer at subsea.connectors.productsafty.gb@siemens.com.
8 USER INFORMATION

8.1 Normal and faulty/dangerous operation

8.1.1 Visible oil discharges from connector

During normal operation of the SpecTRON 45 wet mate pair, it is normal for a film of oil to be left on the receptacle pin after mating. There may also be some oil residue from assembly left in the compensation volume within the connector which may be visible during initial wetted testing.

Continuous, or heavy leakage of oil from the compensation ports on the gland and plug, or from the plug nose may be evidence of damage to the connector internals.

8.1.2 Protection of receptacle contact pins

**Caution.** Risk of material damage.

- Under no circumstances must the contact pins in the receptacle connector be exposed to seawater with power on. If this situation does occur the contact surfaces of the pins will very rapidly degrade by electrolytic action.
- If these damaged pins are subsequently mated into a socket insert there is a very high risk of damage to the insulation and seals within the plug connector.

If the connectors are to be left unmated in seawater dummy connectors and subsea protective caps must be used to protect the pin contacts in the receptacle connectors. The maximum cumulative time for which the pin contacts can be exposed to sea-water over the entire lifetime of the connector is 28 days.

Over exposure will increase the risk of corrosion damage or marine growth on the contact surfaces of the receptacle contact pins. This could lead to damage to the seals and insulation within the socket contacts.

8.2 Troubleshooting (FAQ’s)

For any questions not included below, please contact any of the following:

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<tr>
<th>Department</th>
<th>E-mail address</th>
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<tbody>
<tr>
<td>Product Safety</td>
<td><a href="mailto:subsea.connectors.productsafety.gb@siemens.com">subsea.connectors.productsafety.gb@siemens.com</a></td>
</tr>
<tr>
<td>Technical Support</td>
<td><a href="mailto:connectortechnicalsupport.gb@siemens.com">connectortechnicalsupport.gb@siemens.com</a></td>
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<tr>
<td>Installation and Servicing</td>
<td><a href="mailto:susultlcmsupport.gb@siemens.com">susultlcmsupport.gb@siemens.com</a></td>
</tr>
<tr>
<td>Sales</td>
<td><a href="mailto:connectorsales.gb@siemens.com">connectorsales.gb@siemens.com</a></td>
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**Table 5** Troubleshooting product contact details
9 PRODUCT MAINTENANCE

Danger! Risk of death from electric shock.
- Connectors must not be de-mated whilst live.
- Allow sufficient time for system to discharge any residual voltage to discharge before de-mating connectors
- Connectors must be fully mated before energisation
- Receptacles must not be energised unless mated to a plug

Caution. Risk of material damage.
- Connectors must not be de-mated whilst live.
- Allow sufficient time for system to discharge any residual voltage to discharge before de-mating connectors
- Connectors must be fully mated before energisation
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9.1 Product maintenance (skilled persons)

9.1.1 Removal of Marine Growth and Calcareous Deposits

Warning. Risk of minor personal injury to persons with sensitivities to a solution of 50% Citric Acid.
- Wear appropriate hand and eye protection when handling.

Caution. Risk of material damage.
- Other acid cleaners, such as 50% Acetic Acid, should not be used as they may cause deterioration of the elastomeric materials.
- Chiselling and abrasive methods are not recommended. Use of a water jet is acceptable, but the jet should not be directed into the shuttle pins at the front of the plug as this could result in a risk of water being forced through the primary seals.
- If performing this operation topside, rinse the connector with water when complete.

To remove calcite growth from Siemens Subsea connectors, a solution of 50% Citric Acid is recommended. All seawater exposed elastomeric materials in Siemens Subsea connectors have been fully tested against 50% Citric Acid and are compatible for a duration of 1 hour. In addition, the thermoplastic materials have a good resistance to citric acid.

9.2 Safety/deterioration maintenance checks

9.2.1 Test connectors

Caution. Risk of material damage.
- An appropriate test connector must always be used to make electrical contact during testing.
• Under no circumstances should a foreign object (such as a screwdriver, test probe or crocodile clip) be used as a test connection as this could damage the seals and insulation. Such actions will invalidate the product warranty.

**Danger!** Risk of death from electric shock.

• An appropriate test connector must always be used to make electrical contact during testing.
• Under no circumstances should a foreign object (such as a screwdriver, test probe or crocodile clip) be used as a test connection
• Receptacles must not be energised unless mated to a plug

Guide pins where applicable must never be removed from test connectors as this can lead to damage and will invalidate the product warranty.
10 CUSTOMER COMMENTS/FEEDBACK

Please complete the Sign Off section at the bottom of form to confirm each page of this document has been read and complied with in full.

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Please enter details below e.g. comments; complaints; evidence of good practice; incident reports; observations and recommendations, including any associated with health, safety or the environment, etc., also include any names/contact details of other relevant personnel.

Sign Off Section

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Please e-mail completed form to the Product Safety Officer at the following address: subsea.connectors.productsafty.gb@siemens.com