



## CTS1

### LIQUID MOUNTED PRIMARY SHOE PLATE SEAL

*The CTS1 liquid mounted shoe plate seal has been developed into a market leading efficient and reliable shoe plate seal, often replacing outdated shoe plate seal designs. The shoe plates are connected to the floating roof with robust scissor hangers and the leaf springs ensure long term vapour tightness. CTS' manufactured shoe plate seals are custom designed and manufactured for each individual order and tank which eliminates problems that are common with off-the-shelf types of seals. The tank-specific design ensures a seal with a superior performance.*



#### Features

- Liquid mounted seal type as per the latest standards
- Gastight seal with excellent vapour tightness (reduces over 99% of emissions)
- Eliminating virtually all rain water ingress to the stored product
- Compatible with all known hydrocarbons and chemicals, including 100% aromatics, such as Benzene, Toluene and Xylene
- Available in different material combinations, including stainless steel and galvanized steel
- Suitable for both vertical and horizontal roof rim angles, no rim modifications required
- Service life expectation well in excess of 30 years
- Custom designed and manufactured for each specific tank and application
- Easy installation, up to 50% reduction in men-hours (in-service installation and repair possible)
- Compliant with all international (environmental) standards such as API, EN, BREF IPPC, EPA, ATEX and NFPA as well as with specific requirements such as EEMUA, PGS 29 and VLAREM etc.
- Successfully used by many reputed major oil and tank storage companies
- Suitable for both welded and riveted tank shells
- Can be combined with all secondary seal designs
- Wax scraper for crude oil and other heavy or waxy products available (CTS1W)
- Vapour barriers available in PTFE (Teflon®), NBR, EPDM and other suitable polymer materials, where some of these have been tested and certified as fire safe materials

## CTS1

### Design and engineering

CTS designs each individual seal for the tank it will be fitted on. We will review the rim gap variations to be expected, product properties, tank specifications and many other design aspects in this seal design process. This eliminates the problems that arise when a standard seal is fitted. Our special tank inspection sheet will facilitate the engineering process. Delivery will include as-built drawings and installation manuals.

### Special CTS1 shoe plate seal configurations

We are able to supply different types of CTS1 shoe plate seals, such as a CTS1 Pantograph driven shoe plate seal. This CTS1P has extended arms for the counterweights which are positioned in the liquid below the floating roof. We are also able to implement API RP 545 requirements if and when required.

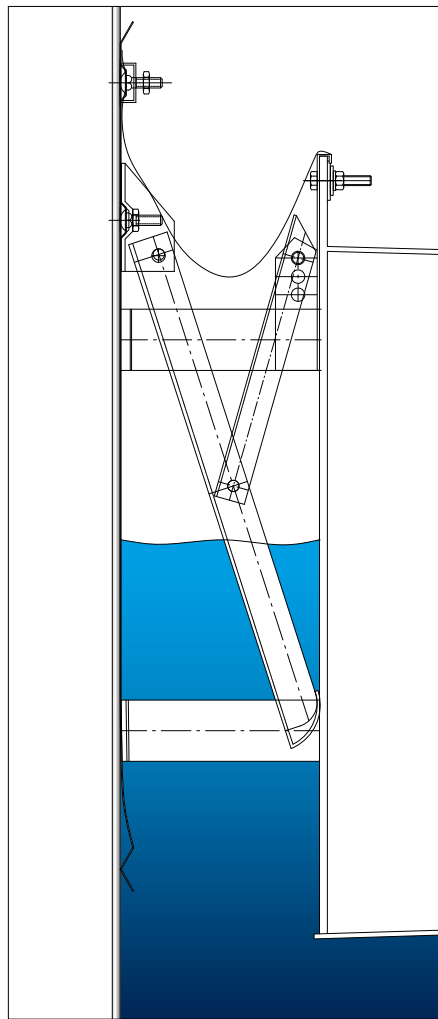
### Seal materials

Not just the design of the seal is important for its performance. Correct material selection is very important to ensure a long term adequate performance for any seal. Seal materials have to withstand the stored product, ozone, UV-exposure and rain water contact. CTS is able to give you a profound advise on the optimal combination of materials, resulting in an economic seal design able to deal with the specific conditions. Seals can be manufactured in a wide variety of materials, including different grades of stainless steel and (fire safe) polymer materials, compatible with 100% aromatics or aggressive chemicals if and when required.

*All our product information and specifications are drafted with extreme care but can be subject to change. We reserve the right to change product specifications.*

### Installation

CTS is capable to install any tank seal on any tank, but the detailed drawings and installation manual we will issue will give you the option to have your own staff or contractor staff installing the seal, resulting in reduced installation costs. Experienced CTS supervision is available upon request.



CTS1 shoe plate seal, cross section.



CTS1 scissor type shoe plate seal with energised hangers, ready to be fitted.



CTS1 scissor shoe plate seal during assembly.



CTS1 scissor shoe plate seal, top view during installation.

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## CTS30

### LIQUID MOUNTED PRIMARY SHOE PLATE SEAL

*The CTS30 is a compression plate type liquid mounted primary shoe plate seal. The design has developed itself into a leading design for external floating roof seals and is based on compression plates pushing against the tank shell, backed up by a stainless steel spring. In between the compression plates and the backup springs there is a vapour barrier made of PTFE (Teflon®), resulting in universal compatibility with all commonly stored products, including 100% aromatics. As the seal design has no complex moving parts it will not encounter problems as a result of corrosion or any other degradation mechanisms affecting seal performance through time. Each CTS30 seal will be specifically engineered and manufactured to fit the tank involved, making sure the seal will be able to deal with both the particular dimensional and design aspects of the tank and external floating roof it will be fitted on.*

#### Features

- Liquid mounted seal type as per the latest standards
- Gastight seal with excellent vapour tightness (reduces over 99% of emissions)
- Compatible with all known hydrocarbons and chemicals, including 100% aromatics, such as Benzene, Toluene and Xylene
- Suitable for both vertical and horizontal roof rim angles, no rim modifications required
- Service life expectation well in excess of 30 years
- Custom designed and manufactured for each specific tank and application
- Compliant with all international (environmental) standards such as API, EN, BREF IPPC, EPA, ATEX and NFPA as well as with specific requirements such as EEMUA, PGS 29 and VLAREM etc.
- Successfully used by many reputed major oil and tank storage companies
- Suitable for both welded and riveted tank shells
- Can be combined with all secondary seal designs
- Wax scraper for crude oil and other heavy or waxy products available (CTS30W)
- Easy and quick installation
- Fire safe seal design

## CTS30

### Design and engineering

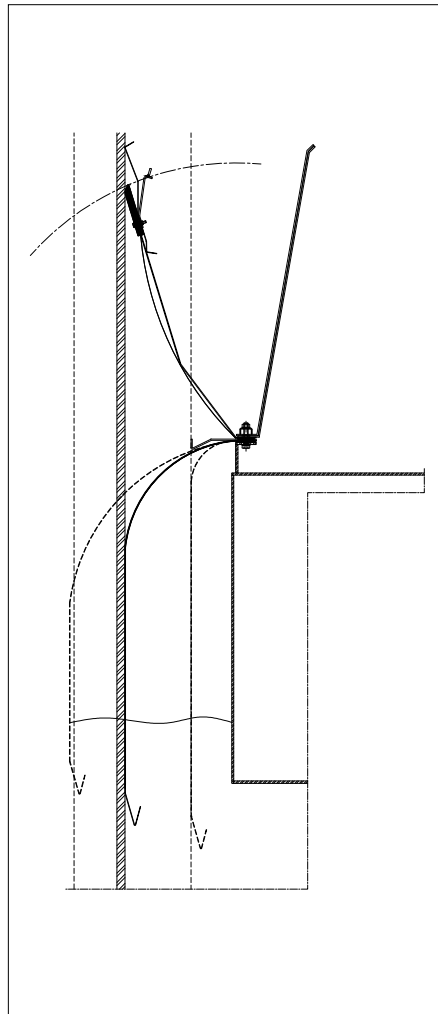
A CTS30 seal can be designed for extreme rim gap variations. CTS designs each individual seal for the tank it will be fitted on. We will review the rim gap variations to be expected, product properties, tank specifications and many other design aspects in this seal design process. This eliminates the problems that arise when a standard seal is fitted. Our special tank inspection sheet will facilitate the engineering process. Delivery will include as-built drawings and installation manuals.

### Materials

Not just the design of the seal is important for its performance. Correct material selection is very important to ensure a long term adequate performance for any seal. Seal materials have to withstand the stored product, ozone, UV-exposure and rain water contact. CTS is able to give you a profound advise on the optimal combination of materials, resulting in an economic seal design able to deal with the specific conditions. Seals can be manufactured in a wide variety of materials, including different grades of stainless steel and (fire safe) polymer materials, compatible with 100% aromatics or aggressive chemicals if and when required.

### Installation

CTS is capable to install any tank seal on any tank, but the detailed drawings and installation manual we will issue will also give you the option to have your own staff or contractor staff installing the seal, resulting in reduced installation costs. Experienced CTS supervision is available upon request.



CTS30-20IT seal combination, cross section.



STT Belgium CTS30 primary seal on steel floating roof.



CTS30 seal during installation, top view.

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## CTS6

### LIQUID FILLED PRIMARY SEAL

*The CTS6 liquid filled primary seal has been around for decades and consists of a wear resistant ribbed envelope containing a liquid filled tube. The inside tube can be filled with any hydrocarbon or water, subject to requirements. The flexibility of the tube and the ribbed surface of the envelope will ensure an excellent long term vapour tightness. CTS' manufactured liquid filled seals are custom designed and manufactured for each individual order and tank which eliminates problems that are common with off-the-shelf types of seals. The tank-specific design ensures a seal with a superior performance.*

#### Features

- Liquid mounted seal type as per the latest standards
- Gastight seal with excellent vapour tightness (reduces over 99% of emissions)
- Compatible with all hydrocarbons with a maximum aromatic content up to 30%
- Available with hardware in stainless steel or galvanized steel
- Service life expectation well in excess of 15 years
- Custom designed and manufactured for each specific tank and application
- Compliant with all international (environmental) standards such as API, EN, ATEX, BREF IPPC, EPA and NFPA as well as with specific requirements such as EEMUA, PGS 29 and VLAREM etc.
- Successfully used by many reputed major oil and tank storage companies
- Suitable for both welded and riveted tank shells
- Can be combined with all secondary seal designs

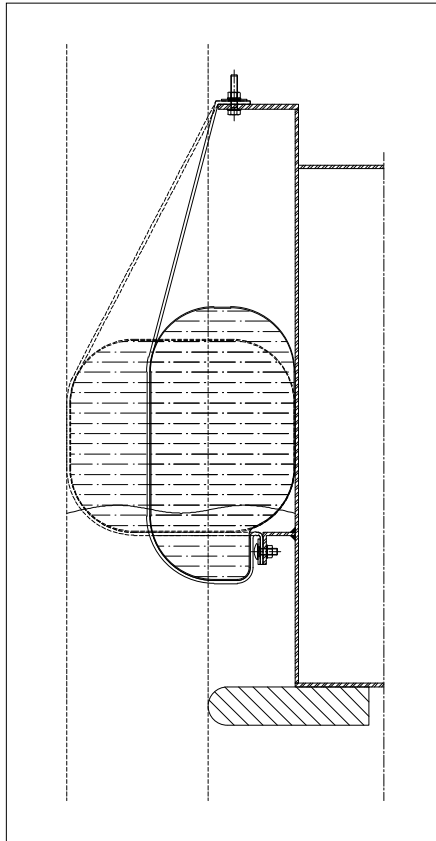
## CTS6

### Design and engineering

CTS designs each individual seal for the tank it will be fitted on. We will review the rim gap variations to be expected, product properties, tank specifications and many other design aspects in this seal design process. This eliminates the problems that arise when a standard seal is fitted. Our special tank inspection sheet will facilitate the engineering process. Delivery will include as-built drawings and installation manuals.

### Seal materials

Not just the design of the seal is important for its performance. Correct material selection is very important to ensure a long term adequate performance for any seal. Seal materials have to withstand the stored product, ozone, UV-exposure and rain water contact. CTS is able to give you a profound advise on the optimal combination of materials, resulting in an economic seal design able to deal with the specific conditions. Seals can be manufactured in a wide variety of materials, including different grades of stainless steel and (fire safe) polymer materials, compatible with 100% aromatics or aggressive chemicals if and when required.



CTS6 liquid filled seal, cross section.

### Installation

CTS is capable to install any tank seal on any tank, but our provided detailed drawings and installation manual will also give you the choice to have either your own staff or contractor staff installing the seal. The economic advantages of having your own (contractor) staff installing the system could be significant, reducing travelling and lodging costs.

Experienced CTS supervision is available upon request.

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## CTS7

### PRIMARY FOAM SEAL

*The CTS7 is a primary foam seal, traditionally known as one of the most effective primary tank seals with respect to reducing emissions. The design is based on a polymer fabric reinforced cover around a resilient foam core being held down by steel plates. As the seal is very flexible it contacts the tank shell in an extended area which provides excellent vapour tightness of the rim space. Each CTS7 foam seal will be specifically engineered and manufactured to fit the tank involved, making sure the seal will be able to deal with both the product stored as well as with the particular dimensional and design aspects of this tank. Primary foam seals can either be vapour mounted or liquid mounted, and are available both for external floating roofs as well as for internal floating roofs.*

#### Features

- Gastight seal, excellent vapour tightness, resulting in maximum emission reduction
- Eliminates much of the rain water ingress to the product stored
- Compatible with all stored products, including 100% aromatics
- Available in different material combinations
- Available as vapour mounted or liquid mounted seal design
- Fitting both vertical and horizontal roof rim angles, requiring no rim modifications
- Designed for each specific tank
- Easy installation
- Compliant with all international (environmental) standards such as API, EN, BREF IPPC, EPA, ATEX, NFPA and the specific standards such as EEMUA 159, PGS 29, VLAREM, etc.
- Successfully used by many reputed major oil and tank storage companies
- Can be combined with all known secondary seal designs

## CTS7

### Design and engineering

A foam seal can be manufactured in many different designs.

#### Several aspects influence this design, as follows:

- **Liquid mounted or vapour mounted**

A foam seal can either be liquid mounted or vapour mounted. The seal will not trap any vapours under the seal in liquid mounted design and emissions will be reduced to an absolute minimum. The direct contact between the liquid and the seal envelope however makes the requirements for the envelope material much more demanding. A vapour mounted foam seal is not in direct contact with the stored product and therefore less vulnerable. In case of a defect seal envelope a vapour mounted seal will also not trap liquid product inside the foam elements.

- **Suspended seal configuration for liquid mounted foam seals**

Liquid mounted foam seals are often executed as suspended by using a steel construction to lower the seal in the rim/pontoon area. The advantage of suspending the liquid mounted foam seal is that the required amount of foam seal materials can be reduced.

- **Different foam shapes**

The shape of the foam and exact geometry will vary subject to the rim gap and other seal requirements.

### Materials

Not just the design of the seal is important for its performance. Correct material selection is very important to ensure a long term adequate performance for any seal. In this respect one also has to realise that fabrics behind secondary seals will be difficult to inspect and malfunctioning seals could represent a hazard, while still mechanically okay.

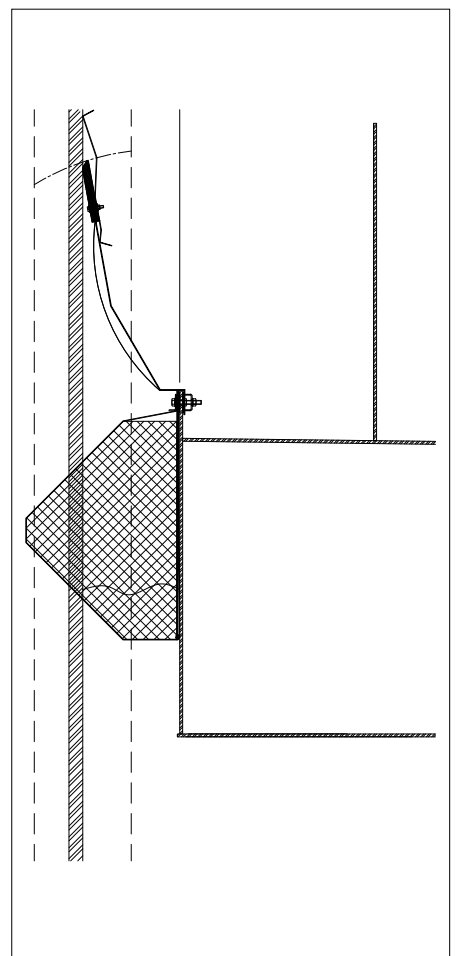
Seal materials have to withstand the stored product, ozone, UV-exposure and rain water contact. CTS is able to give you a profound advise on the optimal combination of materials, resulting in an economic seal design able to deal with the specific conditions. Seals can be manufactured in a wide variety of materials, including different grades of stainless steel and polymer materials, compatible with 100% aromatics or aggressive chemicals if and when required.

### Installation

CTS is capable to install any tank seal on any tank, but our detailed drawings and installation manuals will also give you the choice to have either your own staff or contractor staff installing the seal as well. The advantages of having your own (contractor) staff installing the system could be significant, reducing travelling and lodging costs. Experienced CTS supervision will be available upon request.



CTS7 out of service inspection, bottom view



CTS7-20IT seal combination, cross section.

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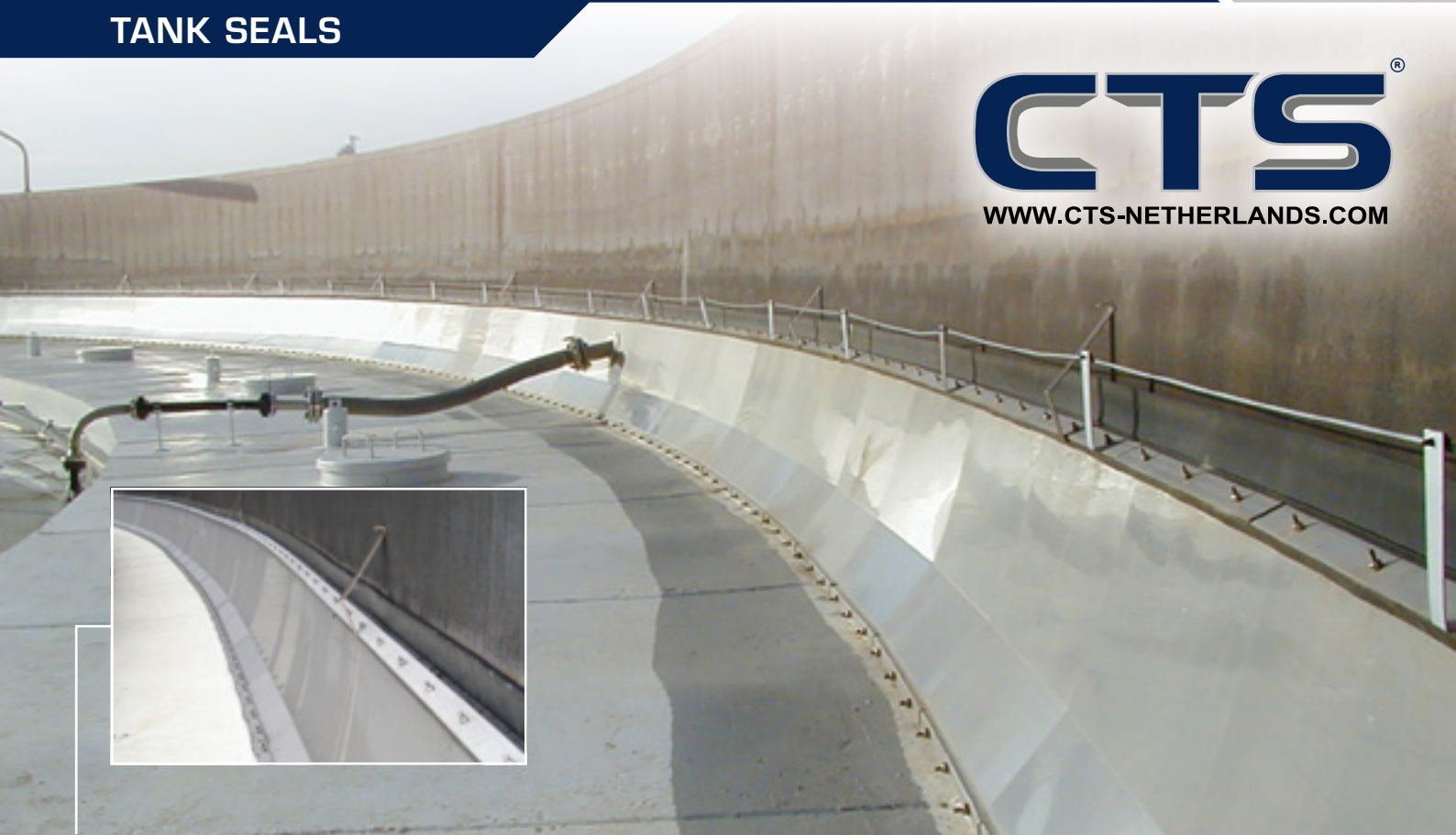
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## CTS40

### DOUBLE COMPRESSION PLATE SEAL

*The CTS40 is a double rim mounted compression plate tank seal (primary and secondary seal). Its design is based on compression plates pushing a rubber tip against the tank shell. Behind the compression plates, fully shielded from weather exposure, is a continuous vapour barrier fabric installed ensuring the vapour tightness of the seal. As the seal design has no complex moving parts it will not encounter problems as a result of corrosion or any other degradation mechanisms affecting seal performance through time. Each CTS40 seal will be specifically engineered and manufactured to fit the tank involved, making sure the seal will be able to deal with both the stored product as well as with the particular dimensional and design aspects of this tank.*

#### Features

- Gastight seal, excellent vapour tightness, resulting in emission reductions in excess of 99% and eliminating the risk of rim fires
- Compatible with all stored products, including 100% aromatics
- Eliminating virtually all rain water ingress to the stored product
- Available in different material combinations, including stainless steel and galvanized steel
- Suitable for both vertical and horizontal roof rim angles, no rim modifications required
- Service life expectation in excess of 30 years
- Designed for each specific tank
- Maintenance free
- Easy and quick installation
- Compliant with all international (environmental) standards such as API, EN, NFPA, ATEX, BREF IPPC and EPA and specific requirements such as EEMUA, PGS 29, VLAREM, etc.
- Successfully used by many major oil and tank storage companies
- Can be used with both welded and riveted tank shells
- A drip skirt can be added to the seal design in order to have a liquid mounted primary seal

## CTS40

### Design and engineering

A CTS40 seal is available in many different configurations. The tip design as well as the seal design are subject to change depending on the service requirements and actual tank conditions. CTS designs each individual seal for the tank it will be fitted on and while doing so we consider the rim gap, product properties, tank specifications and many other design aspects in this process. This eliminates the problems that arise when a standard seal is fitted. Our special tank inspection sheet will facilitate this engineering process. Delivery will include an as-built drawing for the seal and installation manual.

### Materials

Not just the design of the seal is important for its performance. Correct material selection is very important to ensure a long term adequate performance for any seal. In this respect one also has to realise that fabrics behind secondary seals will be difficult to inspect and malfunctioning seals could represent a hazard, while still mechanically okay.

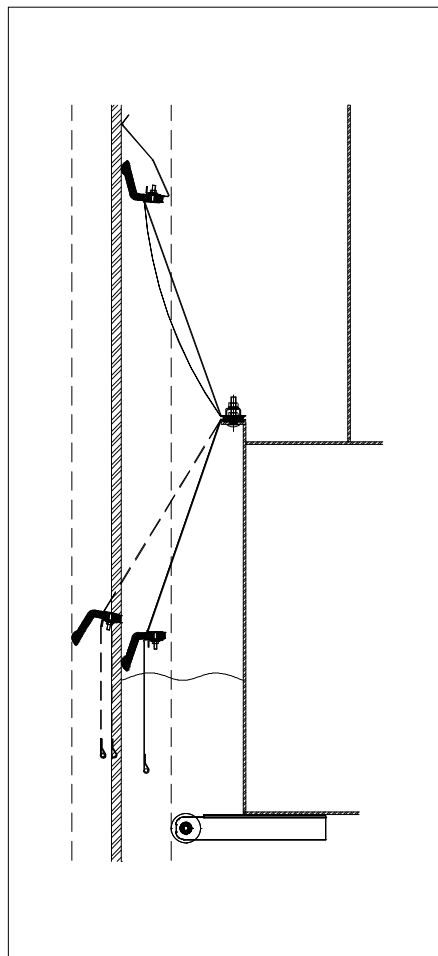
Seal materials have to withstand the stored product, ozone, UV-exposure and rain water contact. CTS is able to give you a profound advise on the optimal combination of materials, resulting in an economic seal design able to deal with the specific conditions. Seals can be manufactured in a wide variety of materials, including different grades of stainless steel and (fire safe) polymer materials, compatible with 100% aromatics or aggressive chemicals if and when required.

### Installation

CTS is capable to install any tank seal on any tank, but our provided detailed drawings and installation manual will also give you the choice to have either your own staff or contractor staff installing the seal. The economic advantages of having your own (contractor) staff installing the system could be significant, reducing travelling and lodging costs. Experienced CTS supervision is available upon request.



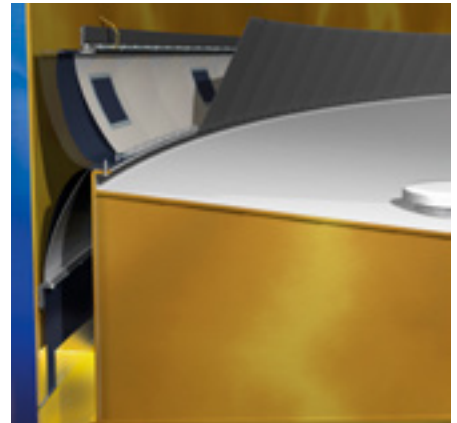
CTS40IT secondary seal.



CTS40L seal combination, cross section.



CTS40L double compression plate seal with skirt.



CTS40 double tank seal, with foam port and integral foam dam.

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## CTS20 SECONDARY COMPRESSION PLATE SEAL

*The CTS20 is an independently rim mounted secondary seal that has developed itself into the leading design for secondary tank seals. Its design is based on compression plates pushing a rubber tip against the tank shell. As the seal design has no complex moving parts it will not encounter problems as a result of corrosion or any other hazards affecting seal performance through time. Each CTS20 seal will be specifically engineered and manufactured to fit the tank involved, making sure the seal will be able to deal with both the product stored as well as with the particular dimensional and design aspects of this tank. Behind the compression plates, fully shielded from weather exposure, is a continuous vapour barrier ensuring excellent vapour tightness.*

### Features

- Independent rim mounted gastight secondary seal
- Excellent vapour tightness, resulting in maximum emission reduction and eliminating the risk of rim fires
- Eliminating virtually all rain water ingress to the stored product
- Compatible with all stored products, including 100% aromatics, such as Benzene, Toluene and Xylene
- Available in different material combinations, including stainless steel and galvanized steel
- Suitable for both vertical and horizontal roof rim angles, no rim modifications required
- Expected service life in excess of 30 years
- Designed for each specific tank
- Easy installation
- Can be installed while the tank remains in service
- Compliant with all international (environmental) standards such as API, EN, BREF IPPC, EPA, ATEX, NFPA and the specific standards EEMUA, PGS 29, VLAREM, etc.
- Successfully used by all reputed major oil and tank storage companies
- Suitable for both welded and riveted tank shells
- Can be fitted as a primary seal, secondary seal or as a combination of primary and secondary seal (CTS40)

## CTS20

### Design and engineering

A CTS20 seal is available in many different configurations. Seal tip design as well as seal design are depending on the service requirements and actual tank conditions. CTS designs each individual CTS20 seal for the tank it will be fitted on. CTS considers the rim gap, product properties, tanks specifications and many other design aspects in this process, eliminating the problems that arise when a standard seal is fitted. Our special tank inspection sheet will facilitate this engineering process. The CTS20 secondary seal can be combined with any existing primary seal, fitting both horizontal and vertical rim angles. The seal can be installed while the tank is in service.

### Materials

Not just the design of the seal is important for its performance. Correct material selection is very important to ensure a long term adequate performance for any seal. In this respect one also has to realise that fabrics behind secondary seals will be difficult to inspect and malfunctioning seals could represent a hazard, while still mechanically okay.

Seal materials have to withstand the stored product, ozone, UV-exposure and rain water contact. CTS is able to give you a profound advise on the optimal combination of materials, resulting in an economic seal design able to deal with the specific conditions.

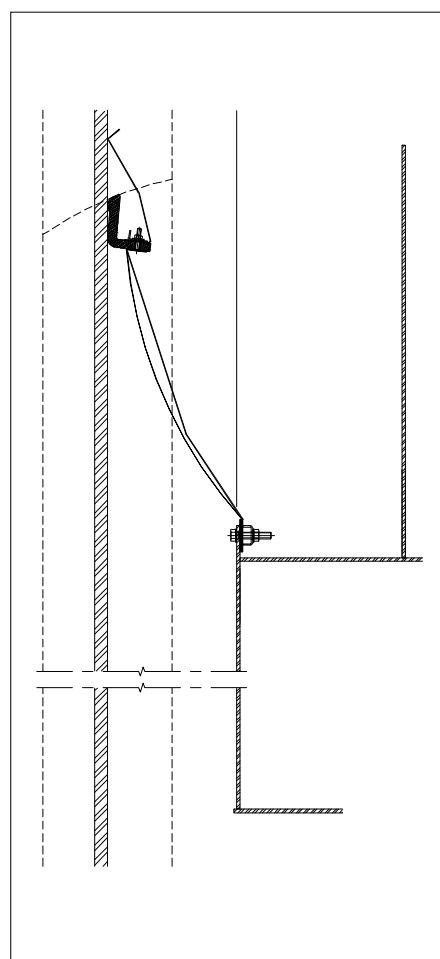
Seals can be manufactured in a wide variety of materials, including different grades of stainless steel and (fire safe) polymer materials, compatible with 100% aromatics or aggressive chemicals if and when required.

### Installation

CTS is capable to install any tank seal on any tank, but our provided detailed drawings and installation manual will give you the choice to have either your own staff or contractor staff installing the seal. The economic advantages of having your own (contractor) staff installing the system could be significant, reducing travelling and lodging costs. Experienced CTS supervision is available upon request.



CTS20L secondary seal with direct foam injection.



CTS20L secondary seal, cross section.

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## CTS20LP

### (LOW PROFILE) SECONDARY SEAL

*The CTS20LP (Low Profile) is an independent rim mounted secondary seal designed to have a minimal elevation from the top of the rim which allows the tank to be filled to a maximum level for maximum capacity. A CTS20LP has a seal elevation of approximately 150-250mm higher than the rim of the floating roof. Connecting the seal to the rim of the floating roof allows the seal to operate independent from the primary seal which is a requirement by virtually all environmental codes.*

*The seal compression springs are covered with a weather and hydrocarbon resistant antistatic fire safe PTFE (Teflon®) vapour fabric. This fabric supported by the springs ensures rainwater run off the seal onto the floating roof. The CTS20LP low profile seal has now been approved by several major oil companies and an extensive number of tanks is operating with this low rise secondary seal configuration throughout Europe.*

#### Features

- Gastight seal, excellent vapour tightness, resulting in an emission reduction in excess of 99% and eliminating the risk of rim fires
- Eliminating virtually all rain water ingress to the stored product
- Compatible with all stored products, including 100% aromatics, such as Benzene, Toluene and Xylene
- Available in different material combinations
- Suitable for both vertical and horizontal roof rim angles, no rim modifications required
- Service life expectation in excess of 30 years
- Designed for each specific tank
- Can be combined with all available primary tank seals
- Easy and quick installation
- Compliant with all international (environmental) standards such as API, EN, BREF IPPC, EPA, ATEX, NFPA and the specific standards EEMUA 159, PGS 29, VLAREM, etc.
- Successfully used by many reputed major oil and tank storage companies
- Can be used with both welded and riveted tank shells
- Allows for a reduced foam dam height

## CTS20LP

### Design and engineering

A CTS20LP seal is available in many different configurations. The tip design as well as the seal design are subject to change depending on the service requirements and actual tank conditions. Normally a CTS20LP seal is designed for a nominal rim gap of 200mm (8") but rim gaps of 400mm (16") can be bridged if required.

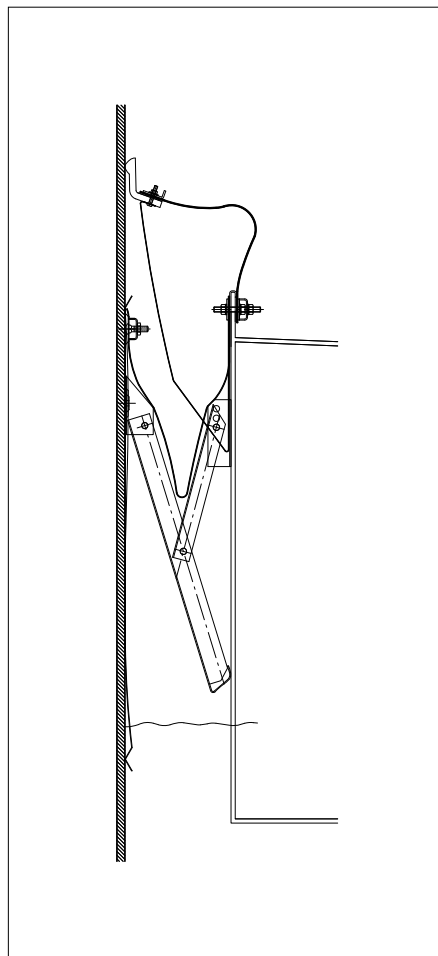
CTS designs each individual seal for the tank it will be fitted on. We consider the rim gap, product properties, tanks specifications and many other design aspects in this process. This eliminates the problems that arise when a standard seal is fitted. Our special tank inspection sheet will facilitate this engineering process. Delivery will include an as-built drawing for the seal and installation manual.

### Materials

Not just the design of the seal is important for its performance. Correct material selection might even be more important to ensure a long term adequate performance for any seal. CTS is able to give you a detailed advise on the optimal combination of materials, resulting in an economic seal design that is able to deal with the harshest conditions. Seals can be manufactured in a wide variety of materials and designs, including different grades of stainless steel and (fire safe) polymer materials, making it suitable for service with 100% aromatics or aggressive chemicals if and when required.

### Installation

CTS is capable to install any tank seal on any tank, but our provided detailed drawings and installation manual will give you the choice to have either your own staff or contractor staff installing the seal. The economic advantages of having your own (contractor) staff installing the system could be significant, reducing travelling and lodging costs. Experienced CTS supervision is available upon request.



CTS1-20LP seal combination, cross section.



CTS20LP low profile secondary seal.



CTS20LP low profile seal during installation.

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