Newsletter

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Dome orders for Bahrain and Costa Rica

Tank seals for BP refinery The Netherlands

Full contact IFR order for ARGOS Oil The Netherlands

March 2009

SYSTEMS AND PRODUCTS FOR INDUSTRIAL CARGO TRANSFER AND STORAGE

CTS in 2008 and 2009

Also in 2008 CTS has developed itself further as a leading company in the design, manufacturing and installation of products and systems for atmospheric storage tanks. Apart from that our industrial supply activities have also grown considerably, and in both areas we are recognized by many of our long standing customers as a reliable and innovative partner for them.

This process is further cemented by a growth in staff in all our offices, and a further growth in projects and contracts handled from our companies. Our portfolio of customers includes all the leading international major oil companies such as BAPCO, BP, ConocoPhillips, ExxonMobil, Hess, Kuwait Petroleum, KNPC, Saudi Aramco, Shell, Total (or TFE, Total Fina Elf) and many others.

Also in the field of independent terminals we are serving the most important terminal organizations on a worldwide basis, where our customers include terminal organizations such as ARGOS, Eurotank (a Vitol company), Odfjell, Oiltanking, Vitol and Vopak.

Right now CTS is serving 4 continents (Asia, Europe, the Middle East and South America) from 9 offices, and we have further plans to expand our presence beyond this covering other important areas. In this process and at the end of 2007, CTS Chile Ltd. started to operate in Central America through a newly established representation office in Costa Rica, incorporating professional engineers with more than 20 years of experience and participation in many projects related to the petrochemical industry.

Where 2007 and 2008 were record breaking years with respect to the number of projects handled at our organization, also our start in 2009 was very impressive. In the Middle East and South America we booked large contracts for aluminium dome roofs and internal floating roofs, and we expect several other major contracts to be confirmed in the upcoming months.

Also our order intake for other products and systems such as tank seals and drain systems remained very strong.

In this process we will remain committed to not compromising on the quality of our systems supplied, this to ensure maximum emission reductions and safety levels for the tanks we will be working on. A further step in this process is our ability to survey actual tank emissions running a modern infrared hydrocarbon detecting camera.

As your support to our company has driven the growth of our company in recent years we would like to express our sincere gratitude for this support we enjoyed in recent years. As such you can rest assured that we will remain dedicated to meeting your expectations in the future as well!

Staff and management of the CTS Group of companies

Please contact us for more information on info@cts-tank.com.

Vitol UAE domes under construction

FRCL (Vitol) UAE Domes and IFR's, a project update

Vitol is currently building 20 new tanks in Fujairah UAE, and CTS Far East (Singapore) has been awarded the contract for Vitol UAE (or Fujairah Refinery Company Limited - FRCL) to design and supply twenty (20) aluminium domes and eighteen (18) aluminium internal floating roofs for tanks varying in diameters from 22m to 57m.

CTS Tool container at site at the FRCL project

These tanks are designed ensuring the highest standards for the stored products will be met, and minimum future maintenance will be required. All tanks are designed per API 650 and other relevant standards and codes with respect to design, safety and emissions. Apart from that they will meet all environmental requirements, including the most stringent international emission reduction requirements as the tanks will be classified representing BAT (Best Available Technique) for reducing emissions. This by eliminating the influence of wind drag on the tank, and further reducing product temperatures by shielding tank contents from the solar radiation.

Now this project is under construction, where construction at site is facilitated by a full set of dome and IFR installation tools supplied by CTS. This greatly improves project quality and progress as all tools specifically required for the installation of the systems supplied are catered for.

Apart from that all safety gear such as safety lines and harnesses required as well as the lifting gear such as the pneumatically driven grip hoists are mobilised after being properly tested and certified.

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Vitol UAE Domes were lifted on early, and jacked along with the remainder of the tank shell rings added

CTS1 Scissor type shoe plate seals for HESS Indonesia and ENAP Chile

In 2008 CTS received multiple orders for supplying CTS1 scissor type shoe plate seals, in combination with CTS20 rim mounted compression plate secondary seals, amongst others from HESS Indonesia (3 new crude oil tanks) and ENAP Chile (existing tanks). The CTS1 is a new generation scissor type shoe plate seal, doing away with the concerns the traditional counter weight driven seals had. The CTS1 shoe plates are connected to the floating roof with hangers and compressed against the tank shell by leaf springs. All CTS' shoe plate seals are custom designed per tank, which eliminates problems that are common with off-the-shelf types of seals. The tank specific seal design ensures a seal with superior performance compared to other primary seal designs.

CTS20IT (Integral Tip) secondary tank seal

For crude oil typically these CTS1 shoe plate seal are equipped with an integral wax scraper, ensuring that minimal wax will remain on the inside of the tank shell, and no product residue is scraped on top of the floating roof.

CTS1 Scissor Shoe Features:

- excellent vapour tightness, resulting in maximum emission reduction
- eliminates much of the rain water ingress to the stored product
- compatible with all stored products, including 100% aromatics
- available in different material combinations, where stainless steel would be our preferred material for long term performance
- suitable for both vertical and horizontal roof rims, without requiring rim modifications
- suitable for large rim gaps
- service life expectation well in excess of 20 years
- custom designed for each specific tank and also suitable for rim gaps requiring a –X and +3X working range for the seal
- easy installation, up to 50% reduction in man-hours possible
- liquid mounted seal
- full installation manuals and project support available
- complies with all relevant standards
- successfully used by many major oil refineries and tank terminals
- suitable for both welded and riveted tank shells
- can be combined with all available secondary seal designs

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CTS1 scissor type shoe plate seal hanger assembly and shoe plate prior to vapour barrier installation

CTS completes 8 aluminium domes for Vopak Botlek, The Netherlands

As part of terminal expansion at Vopak Botlek, Rotterdam, CTS The Netherlands was contracted to supply and install 8 aluminium domes for new tanks in diameters of 31 and 36 meter (4 each).

Dome project at Vopak Botlek as amongst the many completed projects in 2008 by CTS

Dome construction

The project started in July 2008 and it took CTS staff less than 3 weeks per dome to complete construction and to lift each dome onto a tank using a 300 tonne mobile crane. All domes were been built inside the tanks. While the domes were being built other construction activities on the new tanks were going on as well. Due to this very short construction time per dome other contractors could continue their work inside the tank. During the dome construction and erection not a single LTI (Lost time Injury) or any other incident was recorded.

Further project details:

Each dome was designed to a specific client requirements such as:

- elevated aluminium walkways with double hand railing
- four (4) 12" Butterworth tank washing machines dome roof nozzles per tank and aluminium access stairs with platform for safe access to each nozzle
- furthermore each dome is equipped with one (1) Manway and inspection hatch and one (1) 28" fire detection nozzle
- solid counter flashing with drip skirt around dome perimeter has bean designed in order to prevent any tank cleaning water dripping out from the tank
- to meet venting requirements special air vents were manufactured and installed around the dome perimeter for each dome, twelve (12) air vents for each of the 36 meter diameter domes and ten (10) air vents for each of the 31 meter diameter domes

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Dome poject at Vopak Botlek as amongst the many completed projects in 2008

Sliding dome support with anti static wire

Dome orders for RECOPE Costa Rica and BAPCO - Neste Oy project Bahrain

Early 2009 two large contracts were awarded to CTS Group companies, as follows:

RECOPE, Costa Rica:
In order to achieve the best possible quality for the Hydrocarbons stored in their storage tanks, and to reduce VOC-emissions, RECOPE (Costa Rica refinery) has started with a program to change the configuration of their storage tanks from external floating roof tanks (EFRT) to tanks equipped with aluminum dome roofs. This converts the existing external floating roof tank to an internal floating roof tank, representing significant tank safety, product quality and maintenance benefits. The order for conducting this conversion project has been awarded to CTS South America, through its offices in Costa Rica.

In 2008 CTS Costa Rica also received it's first order from RECOPE for the design, supply and installation of a aluminum geodesic dome for a new tank of 100.000 bls. Engineering the tank as an aluminium dome tank will result in significant design advantages, as mentioned above.

BAPCO-neste Oy project, Bahrain
In Bahrain BAPCO together with Neste Oy from Finland is realizing a project for lube oil production, as contracted to Samsung and local contractors for the smaller parts of the project, such as the tank farm. To store the products involved the new tanks to be built will all be equipped with aluminium dome roofs, designed to contain a positive internal pressure. This allows BAPCO to operate the dome roofs equipped with P/V vents, or to introduce a Nitrogen blanket at a positive internal pressure.

Representing a total volume of 15 domes these projects do further illustrate the impressive international growth of the CTS Group of companies, supporting this specific market of storage tanks.

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CTS's Project support gives great emphasis to site supervision and tools

IFR seal replacement within 2 weeks

At the end of 2008 RECOPE Costa Rica gave CTS an order for the urgent supply of a CTS70 double wiper seal for an existing internal floating roof (IFR). Quite often IFR seals are not correctly designed, and as a result on not being compatible with the product seals will than fail early. Often this is not detected as the tanks will only be opened and cleaned for their regular maintenance once in a period ranging from anywhere between 5 and 20 years.

CTS has extensively tested and monitored the performance of its IFR seals, and is able to offer an excellent solution fitting special low weight and resilient IFR wiper seals on tanks requiring a seal replacement, independent whether these were supplied by CTS or not.

Remarkable is that CTS was able to completely deliver and install the CTS70 seal within 2 weeks from having received the order. The seal has been installed in the Moín refinery in a tank that stores alcohol. This seal will significantly reduce emissions from the stored product. The material of the CTS70 double wiper seal is compatible with a wide range of petrochemical products, including the 100% aromatics.

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CTS' IFR wiper seal after more than 10 years in service

Internal floating roofs (IFR's) for Vopak Indonesia

For Vopak to Tanjung Priok Terminal project in Jakarta, Indonesia, CTS Far East (Singapore) has supplied 10 units of aluminium internal floating roofs (skin and pontoon type), ranging from 22 to 27 meter in diameter. These internal floaters are equipped with a state of the art liquid mounted shoe plate primary seal, executed with a PTFE vapour barrier.

Vopak project specifications also required heavy duty floating roofs for this project. This kind of roof is suitable for heavier loading. While standard concentrated load requirement for an IFR per API 650 is 500 lbs (app.227 kilograms), the heavy duty roofs supplied are able to bear a 750 lbs (app. 340 kg) concentrated load anywhere across its surface.

The project is scheduled for construction and completion in 2009.

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Skin and pontoon IFR, bottom view

CTS30 CTS20 seal combination for BP Refinery Europoort, The Netherlands

Recent inspections of external floating roof tanks at the BP Refinery Europoort (KPE) refinery in Rotterdam initiated an initiative to further improve both the design of these seals, as well as the materials used. CTS did support these tank inspections, and submitted a proposal to further improve seal design for the existing external floating roof tanks.

For BP an initial tank was fitted out with a vapour tight CTS30 liquid mounted primary seal with integral wax scraper. As this tank was previously equipped with a so-called SIPM Patent seal the project had some specific requirements as the nominal rim gap for this tank used to be app. 500mm. By adding a rim extension plate a modern seal can be fitted, but a shoe plate seal also requires a vertical rim to allow pushing the seal plates against the tank shell. As this vertical rim was not present after realising the rim extension, and given the excessive costs for realising a vertical surface at the roof perimeter a CTS30 seal was specifically designed for this large crude oil tank.

The CTS30 primary seal consists of metal compression plates firmly pressing against the tank shell. Behind these compression plates an antistatic PTFE vapour barrier is installed which provides an excellent vapour tightness. This combination is installed into the rim space and penetrates the stored product with the lower part of the seal. This makes this seal a **liquid mounted** seal construction.

This seal is suitable for maximum rim gaps as per –X and +3X paragraph of EEMUA, as all CTS designed seals are designed to effectively seal off possible rim gaps based on an extensive field inspection.

Advantages CTS30 liquid mounted primary seal:

- Liquid mounted seal
- High emission reduction
- Maintenance free
- Long service life
- Can be combined with different extinguishing systems
- Very wear resistant
- Suitable for nearly every product
- Easy installation
- Short delivery time
- Can be fitted to both vertical and horizontal rims

Typical material specification for a CTS30 seal:

- All metal parts: Stainless steel
- Vapour barrier: Reinforced PTFE (Teflon®, antistatic)

Fast track delivery and fast installation:

CTS is able to supply materials for a complete tank in less than 2 weeks. This can reduce downtime for a tank considerably, especially when seal replacement was unexpected and not foreseen prior to opening the tank. Apart from that the seal construction enables fast installation, allowing tank owners to commission tanks within the shortest time frame possible.

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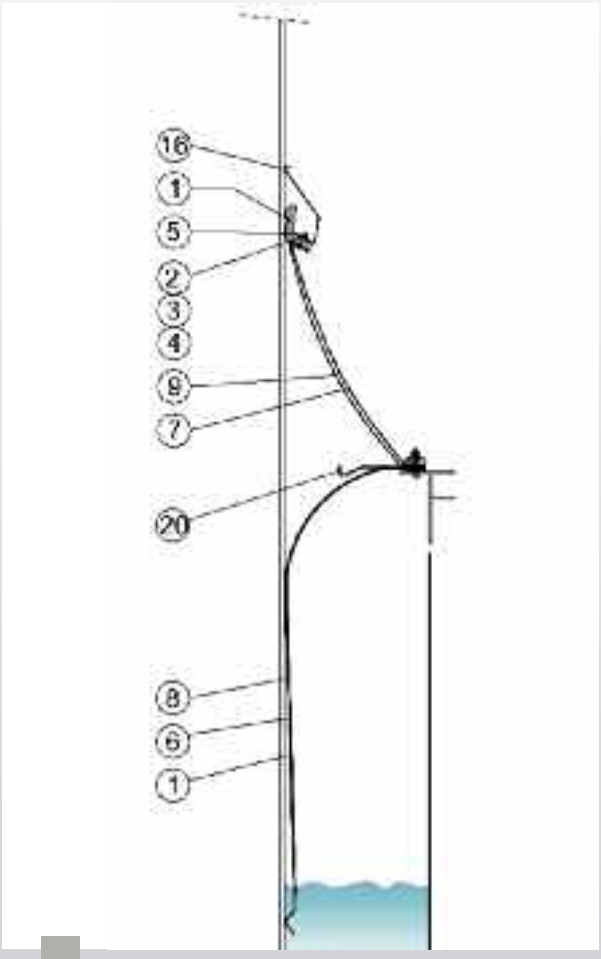

CTS30 CTS20 seal combination, typical drawing

CTS30 BP CTS30 liquid mounted primary seal with integral wax scraper, bottom view

CTS30 BP CTS20L secondary seal after installation, top view

Bulk storage dome contract awarded for Podilsky Cement, Ukraine

In 2007 CTS successfully realised a bulk storage dome turn key project (Ø105m Aluminium Bulk Storage Dome for limestone store) for Irish Cement Ltd. (a CRH Company). As this project was satisfactorily completed within the planning given, CTS was approached in 2008 by another CRH operating company located in the Ukraine, Podilsky Cement for realising a similar project.

105m diameter dome under construction by CTS

As a part of an investment and modernization project Podilsky Cement asked CTS to work out the possibility of delivering and constructing an Aluminium Bulk Storage Dome for the lime stone store and covering the stacker/reclaimer unit. The challenge that CTS faced was the fact that Podilsky Cement already had a finished and approved design for a different type of a lime stone store being a complete steel structure. CTS had to incorporate a part of a existing design in the dome design. On the basis of minor changes to the existing design CTS was awarded a contract for supplying and erecting the aluminium bulk storage dome in a diameter of 105 meter, and with an approximate height of 32 meter.

Bulk storage dome, interior view after completion

Though the dome supplied will be similar in dimensions to the one delivered to Irish Cement Ltd., it was designed according to the local Ukrainian building codes using multiple load cases and load combinations. This to ensure it will be able to deal with all possible weather and dust load conditions. The dome design incorporates a 6x6 meter truck door, 3 man doors and a conveyor opening.

Using a temporary 75m high self erecting central tower the dome will be constructed in 2009 from the ground level up, improving project safety building the dome structure with a total weight of app. 158,000 kilograms (158 tonnes).

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CTS' infrared inspections on tanks visualise hydrocarbon emissions

Leak detection and repair programs (LDAR) are becoming increasingly important when stepping up efforts further reducing Hydrocarbon emissions. One of the latest and most convenient methods to actually trace and visualise Hydrocarbon emissions is using an IR-camera.

Though this represents a serious investment, CTS has procured such an IR-camera to report on Hydrocarbon emissions. The camera works with a cooled mid-wave detector (3-5 µm), that filters near the maximum absorption of the C-H compounds. One filter allows the detection of many gases as the gas absorbs energy at the same waveband that the filter transmits to the detector. By absorbing radiant energy, the gas and motion of the gas is imaged, identifying and imaging Hydrocarbon emissions as large black clouds of visible smoke.

CTS has conducted several tank inspections, and apart from being able to detect Hydrocarbon vapours escaping from areas as the rim seal, the gauge pole and the legs we also found several tanks where the camera detected leaking pontoons (having product inside) and suspect welds on the centre deck (showing Hydrocarbon vapours escaping). Apart from that the camera can also be used to monitor sludge levels in tanks.

The findings from the camera inspections can serve a multitude of purposes, where the most important are the following:

- leak detection and repair (LDAR), to reduce emissions improving environmental standards and reducing product loss
- improve structural integrity of the tanks inspected (weld defects and leaking pontoons are easily spotted)
- improve safety for storage tanks
- report tank condition to relevant authorities (for instance show seals being tight, avoiding seal gap measurements but reporting real seal tightness)

The images shown along this article will give you a good idea on the visibility of the Hydrocarbon vapours, which usually remain invisible. As these inspections do take very little time they can have a large impact improving the condition and safety for your tanks, by verifying actual emission behaviour for tanks.

If you would be interested for developing an inspection program for your tanks than please do contact us for such a program.

Please contact us for more information on info@cts-tank.com.

The following are the detectable Hydrocarbons using this technology:

Methane	Hexane	Isoprene	Ethyl-Benzene
Ethane	Heptane	1-Pentene	Methanol
Propane	Octane	Benzene	Ethanol
Butane	Ethylene	Toluene	Methyl Ethyl Ketone (MEK)
Pentane	Propylene	Xylene	MIBK

EFRT leg emissions, made visible with IR imaging

Pontoon man hole emissions from product inside

Emissions from tank seals are also made visible

Dome lifts for CEPSA Spain, OMV Austria and ExxonMobil The Netherlands

In recent months several large dome lifts were completed by CTS. These are usually done by mobile crane, or by running the air driven wind girder mounted grip hoists to lift a dome from the bottom of the tank. Where a mobile crane can lift a dome from both the inside of the tank, or if built adjacent to the tank, the grip hoists can only lift domes built inside the tank shell. For larger tanks grip hoists represent the more economic lifting method though.

ExxonMobil refinery dome lift, The Netherlands

CTS has built a vast experience realising dome lifts, and has recently invested in a 3rd set of grip hoists with a capacity of 3 tonnes per hoist, able to lift domes in excess of 80 meters diameter. As a dome lift represents the most sensitive activity in any project, great care is given by CTS to risk analysis and lifting plan preparations. For grip hoist lifts also the tank integrity is reviewed prior to lifting a dome.

Along with this article you will find dome lift images on 3 lifts recently realised by CTS:

- CEPSA Spain, a 30.48 meter diameter tank, built inside the tank and lifted with a mobile crane
- ExxonMobil The Netherlands, a 35m diameter tank built outside the tank to reduce tank out of service time, lifted with a large mobile crane as the dome construction area was quite remote from the tank
- OMV Austria, a 71m diameter tank built inside the tank and lifted with a set of air operated synchronised grip hoists

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Dome lift by crane at CEPSA Algeciras, Spain

Dome lift using grip hoists at OMV Vienna, Austria

Drainmaster drain system order for PERTAMINA Indonesia

Early 2009 CTS has been awarded an order for Drainmaster joints for drain systems being part of new tanks for PERTAMINA Indonesia. Several different designs are available for drain systems on external floating roof tanks, where the Drainmasters are part of a rigid drain pipe system with hose swivels allowing the movement of the floating roof.

For this last system CTS has developed the Drainmaster joint, which is based on using Hostaflon, a modified PTFE material (Teflon®) as cover for the composite hose used with stainless steel internal and external helix. The reason for using this external material is its superior chemical resistance, improved liquid and gas tightness and great mechanical properties.

The Drainmaster pivot fitting the hose is made from either steel, galvanized steel or stainless steel. It is shaped in a box structure, resulting in improved mechanical stability, and manufactured with great attention for detail such as the shape in the area of the bearings which eliminates friction and loads on the bearings present at the pivoting point.

Drainmaster joint in tank drain line

Apart from supplying the drain system components CTS is also designing the complete drain line system and calculating proper water flow rates.

Multiple major oil companies have now accepted the Drainmaster swivel, and have used these successfully in their external floating roof drain systems. Pertamina is another company that will be using this technology to ensure proper rainwater draining from their tanks.

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Drain line with Drainmasters during tank painting program

Full contact IFR order for ARGOS Oil The Netherlands

In 2008 CTS was contracted to supply 15 direct contact internal floating roofs for new tanks under construction at the ARGOS Oil Terminal Rotterdam by Verwater.

As full contact internal floating roof will reduce the emission from these tanks easily well in excess of 97% compared to a reference tank.

Special to this project was that in a later stage it was decided to coat the tanks internally completely, and therefore the liquid mounted shoe plate seal was extensively tested by CTS by running it in a test assembly across the coated surface. Using this test it was shown that 300 seal travelling cycles resulted in virtually no coating wear, and that the seal could be used in combination with the tank shell coatings specified.

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Top view aluminium full contact IFR, showing gauging and sampling funnel

Bottom view aluminium full contact roof

ISO 9001 quality assurance system certificate awarded to CTS

Working in refineries and the terminal industry requires a special approach, putting safety and quality first.

CTS has been working under the VCA** (SHE) standard for quite some time now, as audited by Lloyds Register awarding CTS a VCA** certificate under number 661377.

Along with complying with strict SHE standards, CTS has now also an audited and certified Quality Assurance system. The audit was done by Lloyds Register (LR) and CTS has been awarded an ISO 9001 certificate per 9 July 2008 under Approval Certificate Nr. 663184.

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CERTIFICATE OF APPROVAL

This is to certify that the Quality Management System of:

CTS B.V.
Rotterdam, The Netherlands

has been approved by Lloyd's Register Quality Assurance to the following Quality Management System Standards:

ISO 9001 : 2000

The Quality Management System is applicable to:

- Design, distribution, installation and maintenance of systems and products for atmospheric storage tanks.
- Distribution of industrial products and systems.

Approval Certificate No: 663184

Original Approval: 9 July 2008
Current Certificate: 9 July 2008
Certificate Expiry: 8 July 2011

Issued by: LRQA (Rotterdam)

This document is subject to the provision on the reverse

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