



Bunding Safety Systems

INDEX

Tk-Bunding Structure Design.....	4
Bund Fire, Fumes, Ignition, Vaporization Supression, Deactivation, Protection Technologies.....	9
TechnoKontrol Anti-Fire Alloy Mesh.....	10
TK-Bunding QSSHE/QMSSHE Protection Levels.....	12
TK-Bunding Wall.....	19
TK Bunding Cages.....	20
QSSHE/QMSSHE Regulations.....	29

Extra Bund QSSHE Regulations.....	31
EU-UK Environmental Oil Storage Regulations.....	36
Does your installation require bunding?.....	38
Commercial Applications.....	44
Petrol Chemical Industry Compliance Certificate.....	50
Certificates.....	60
Legal Notice.....	62
Contacts.....	64

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National Fire Protection Association
The authority on fire, electrical and building safety



TK-Bunding Safety Systems
Boilover, Explosion
And Liquid Spill Safety
Technologies

Tk-Bunding Structure Design



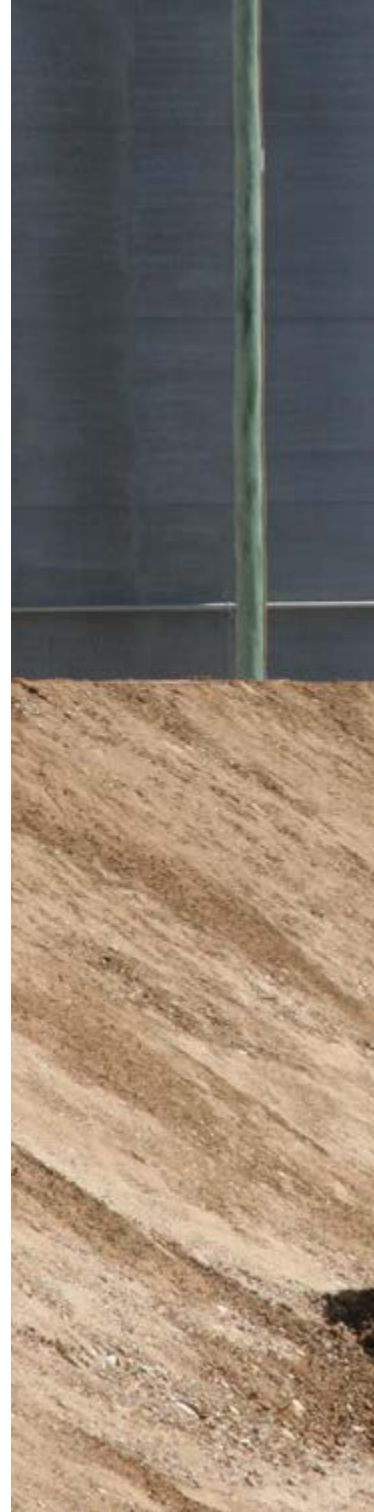
TK-Bunding Safety Structures are constructed retaining walls designed to prevent inundations or breaches from a known source. They are secondary and third containment systems commonly used to protect environments from spills where fuels and chemicals are stored.

The TK-Bunding Structures have the great benefit of not only containing the stored liquids in case of an incident or emergency from the storage tank breakage, fire, explosion, boilover but also being designed and having incorporated inside the bund structure two thermal, fire and flame protection systems which in the event of an fire, explosion or even the disastrous boilover scenario the spilled fuels or chemicals which are extremely flammable and to which most possibly being ignited can't weaken and/or melt the bund structure due to the massive, continuous thermal radiation reaching over the 900°C in the event of a fuel fire from the storage tank.

Having these TK-Bunding Safety Systems incorporated in the bund structure allowing that even any continuous thermal flame, fire, heat exposure, radiation over many hours or even days being structurally prepared to support the bund structure integrity and even more importantly not allowing the liquids spilling over or penetrating into any other bunds, drainage, sewage systems thus not only reducing the risk of thermal flame or fire exposure from one site to another but also in protecting the environment and following any QSSHE corporate and/or government directives.

The TK-bunding must be large and strong enough to contain the contents of an entire tank, though regulations may require it to be up to a third larger. When multiple tanks share a bund, the capacity is based on the largest tank. One of the most common designs for large tanks is a concrete or masonry wall around the tank with a concrete floor. The outside of the wall may be reinforced with an earth

The TK-bund normally has a mobile, flexible cover or roof to prevent precipitation, climatic changes, dirt, debris from getting in, but procedures are taken to provide adequate ventilation when storing flammable liquids. Another design uses a channel that drains the liquid to a secondary containers.





Bund Fire, Fumes, Ignition, Vaporization Suppression, Deactivation, Protection Technologies

The issue of having installed a specialist protection TK-Bund structure to withstand any amount of fuels, chemicals and/or liquids has been pointed out above but the most serious scenario being that the fuels once haven spilled into the bund structure being ignited and causing the storage, jumbo tank in being imbedded into a fuel fire pool/bund which again increasing the possibility of not only of the increasing of the fire but also creating a perfect environment for a BLEVE explosion.


Thus the TK-Bund design incorporates in the bund section a fully incorporated and installed alloy meshing which will not only stop the spilled fuel flames continuing to burn but also in a extreme case scenario in allowing the fire services to easily extinguish any flames by using TK-Anti Fire Textiles Blankets, foams or even water.

Once the spilled ignited fuels enter into the bund section, then the TK-alloys will not allow the fuel to continue its burning process. The bund will not lose its safety directive minimum volume capacity as having the TK-Alloys installed will only have a total liquid volume loss of 1%-2% depending on the final design.



TechnoKontrol Anti-Fire Alloy Mesh

Once the spilled fuels are safely located in the bund section these can be then drained into any emergency, environment protection drainage, pipeline, tank system or even being pumped back into any road tanker for fuel cleaning/filtering and being able to be re-used, if so desired, as the fuels chemical composition shouldn't have changed and only being an issue the possible mixture with external debris thus recommending a full filtration and analysis before its re-use in its original form or in form of other products thus reducing product and financial loss.



The vaporization of any spilled fuel or chemicals being reduced are other benefits of the TK-Alloys and also protecting the whole structure against lightings, sparks, maintenance operation errors, etc.

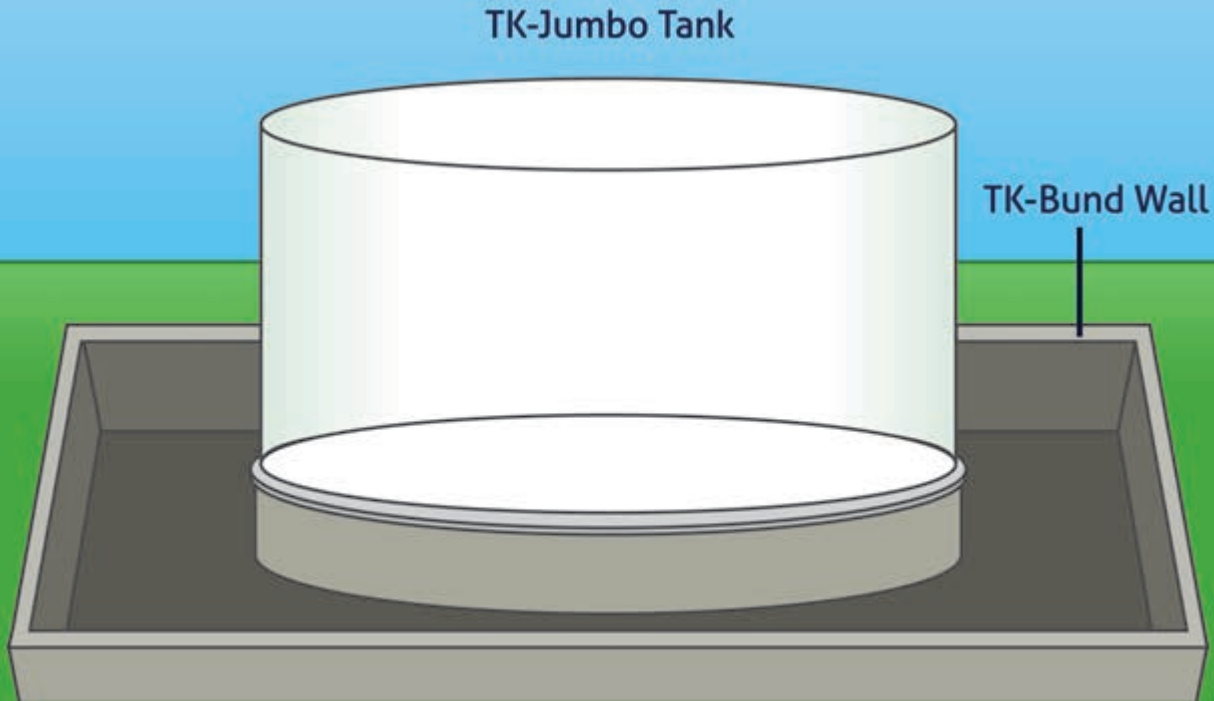
The bund is also fully protected against oxidation, corrosion thus the external part of the fuel tanks which sit inside the TK-Bund section benefiting from the TK-Alloy its physical contact with the alloys/metal in reducing oxidation, electrostatic charges, electromagnetic waves, etc. The spilled fuels inside the bund will also have the benefit of not creating or developing algae thus located spilled fuels not emitting fuel decomposition odours.

TK-Bunding QSSHE/QMSSHE Protection Levels



Level 1 - Bunding Tank

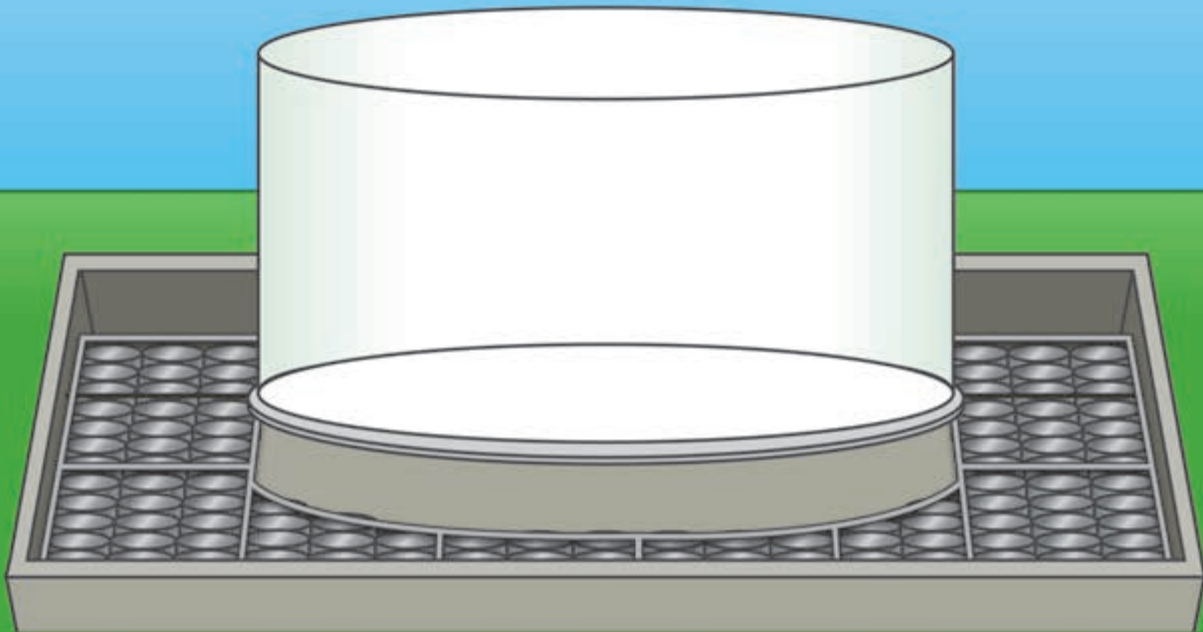
Protecting the TK-Bund structure with thermal, fire, flame protection TK-Alloys/TK-Panels to contain a fuel fire of a minimum of 6 hours at 900°-1150°c. (Internal, inside to tank, ground bund wall sections.)



Level 2 - 25%

Level 1 + level 2. The bund internal section surrounding the storage tank at 25% minimum total fuel storage tank volume.

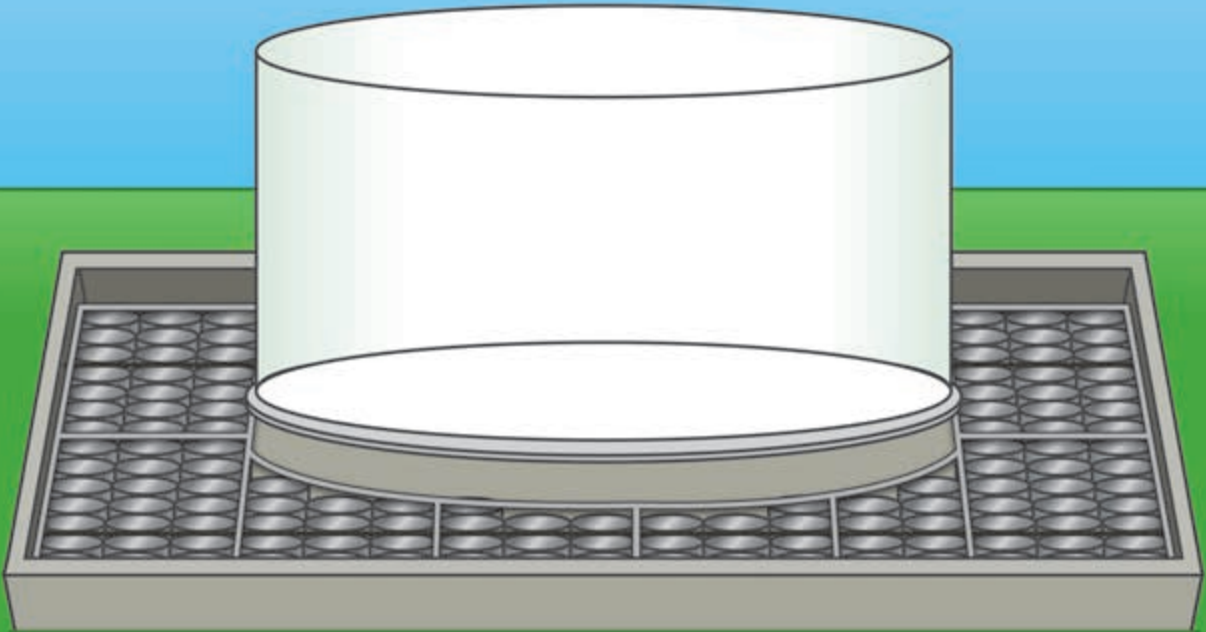
(Example: 1,000,000 litre fuel tank would require 250,000 litres of TK-Alloys.)



Level 3 - 50%

Level 1 + level 3. The bund internal section surrounding the storage tank at 50% total fuel storage tank volume.

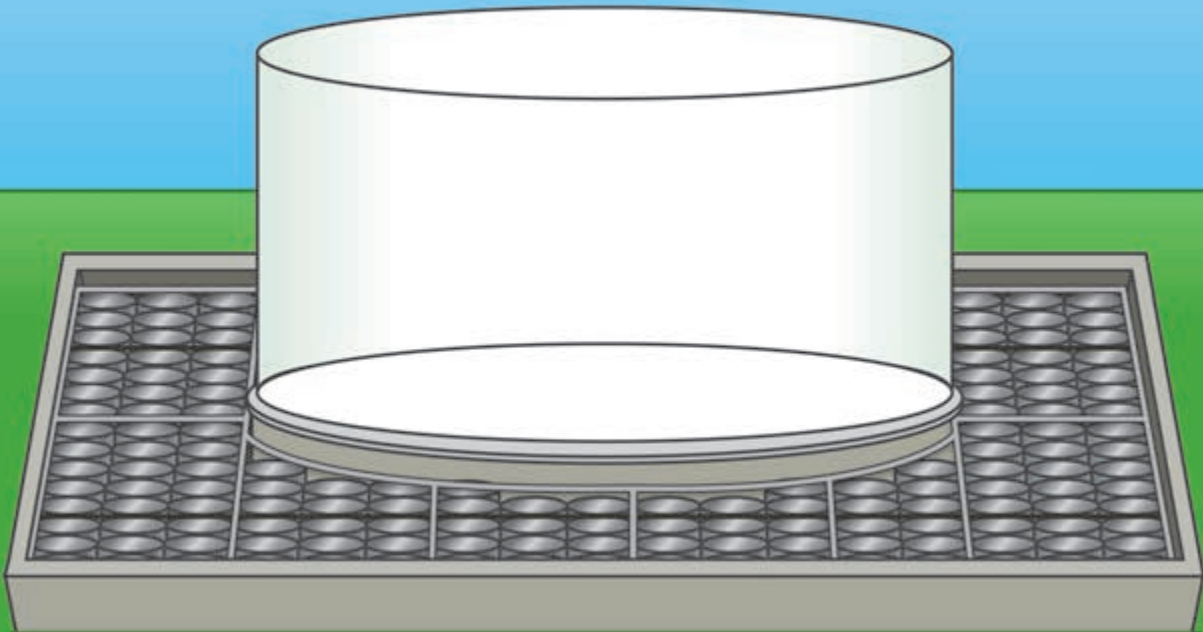
(Example: 1,000,000 litre fuel tank would require 500,000 litres of TK-Alloys.)



Level 4 - 75%

Level 1 + level 4. The bund internal section surrounding the storage tank at 75% total fuel storage tank volume.

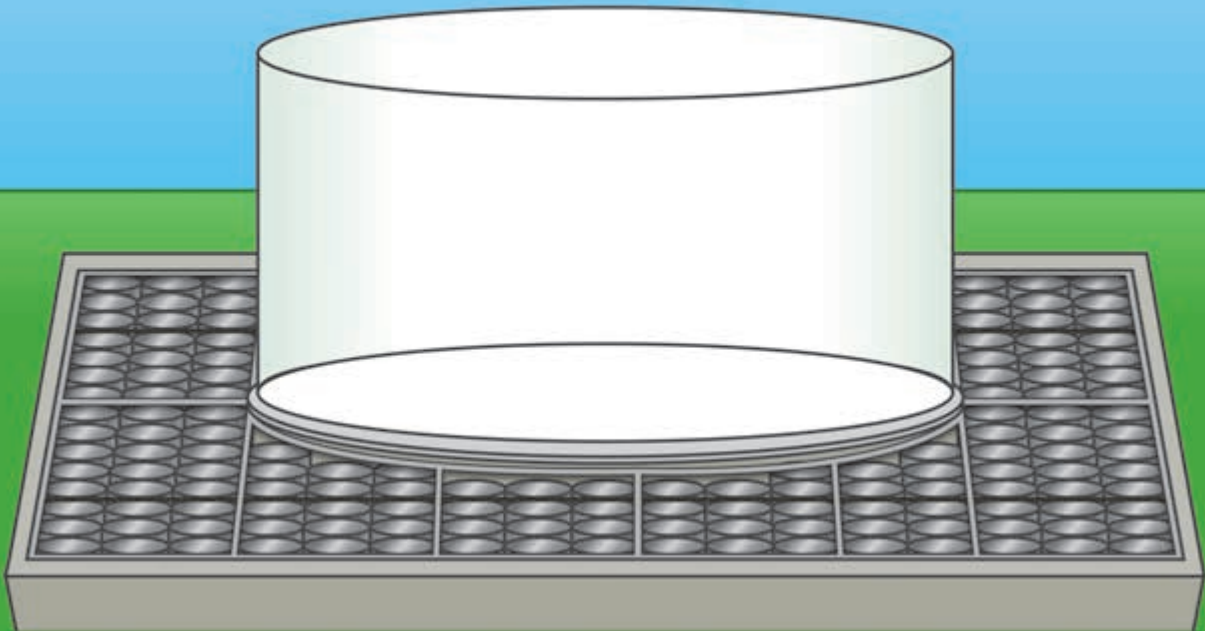
(Example: 1,000,000 litre fuel tank would require 750,000 litres of TK-Alloys.)



Level 5 - 110%

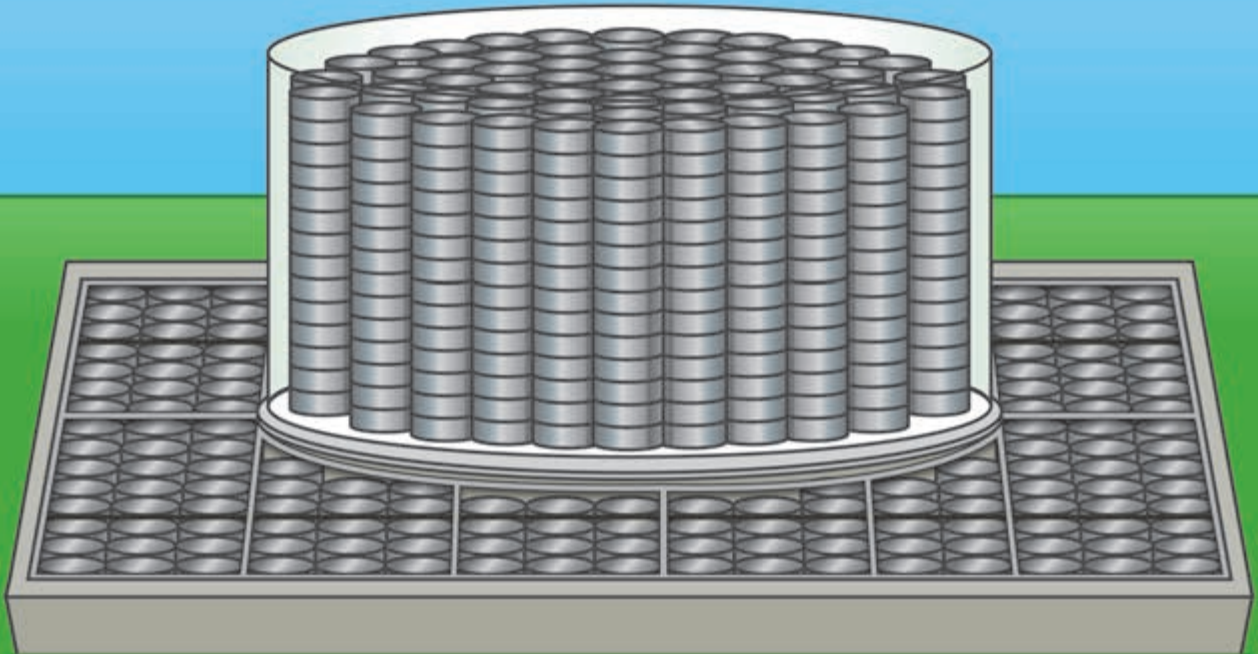
Level 1 + level 4. The bund internal section surrounding the storage tank at 110% maximum total fuel storage tank volume.

(Example: 1,000,000 litre fuel tank would require 1,100,000 litres of TK-Alloys.)

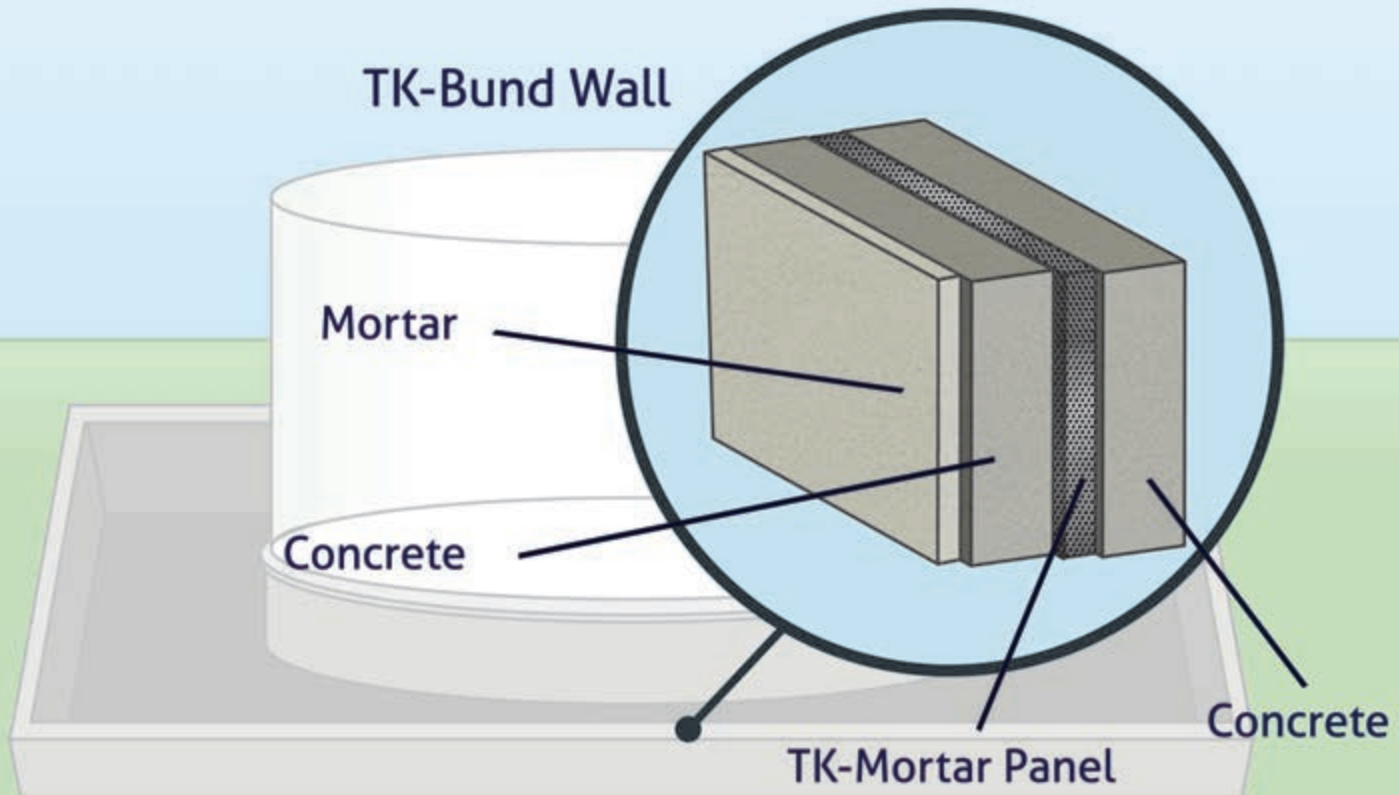


Level 6

Level 1 + level 4 + level 5. The inside of the storage tank fully protecting with TK-Alloys with the complete internal capacity and also being fully protected the TK-Bund area. Thus creating the maximum level of QSSHE protection possible globally.



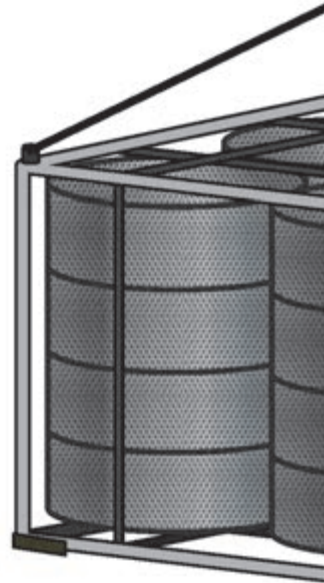
TK-Bunding Wall

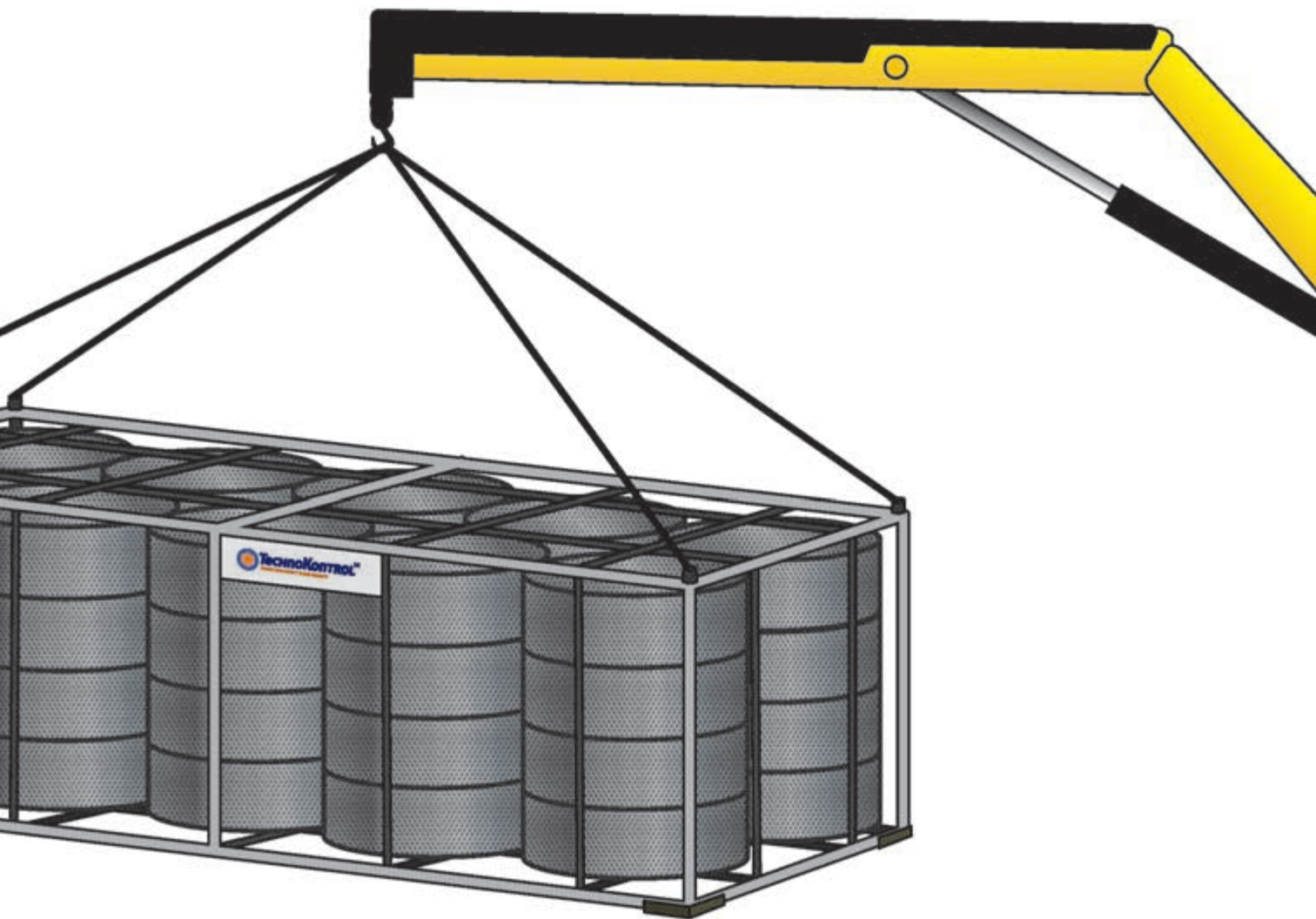


TK Bunding Cages

The TK Bund Area can be filled with different levels of TK Safety alloys which are transported, installed, stored in custom made -designed TK- Cages to withhold, secure, store the TK Safety Alloys during its operational life.

The TK Cages are made of stainless steel and inside their main frame tubular structures they are also filled with TK-Alloys to increase and able to withstand maximum thermal radiation, heat, flames and liquid movement in the event of the deposit, fuel tank suffering partial or complete structural failure a sin an explosion or boilover scenario.

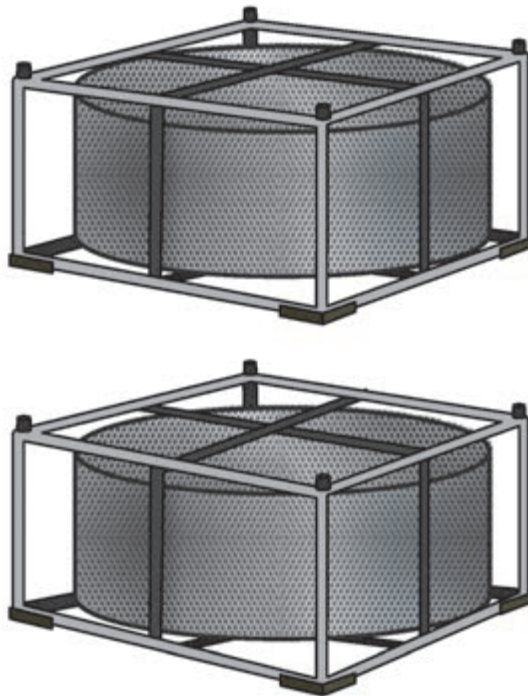


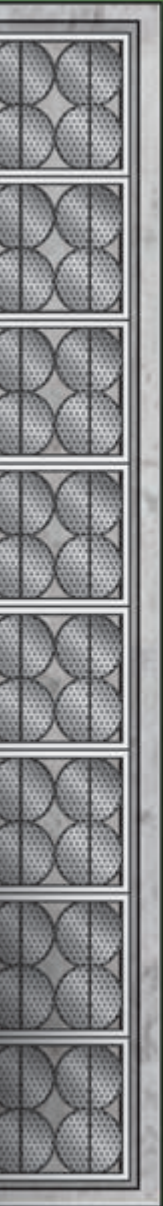


The TK Cages are designed to fit perfectly into the TK Bund Area thus allowing the maximum protection due to its direct contact with the TK-Alloys but also allowing maximum contact, covering, protection with and around metal pipes, pipelines, cabling, metal structures as fuel tanks, store facilities, pumping stations.

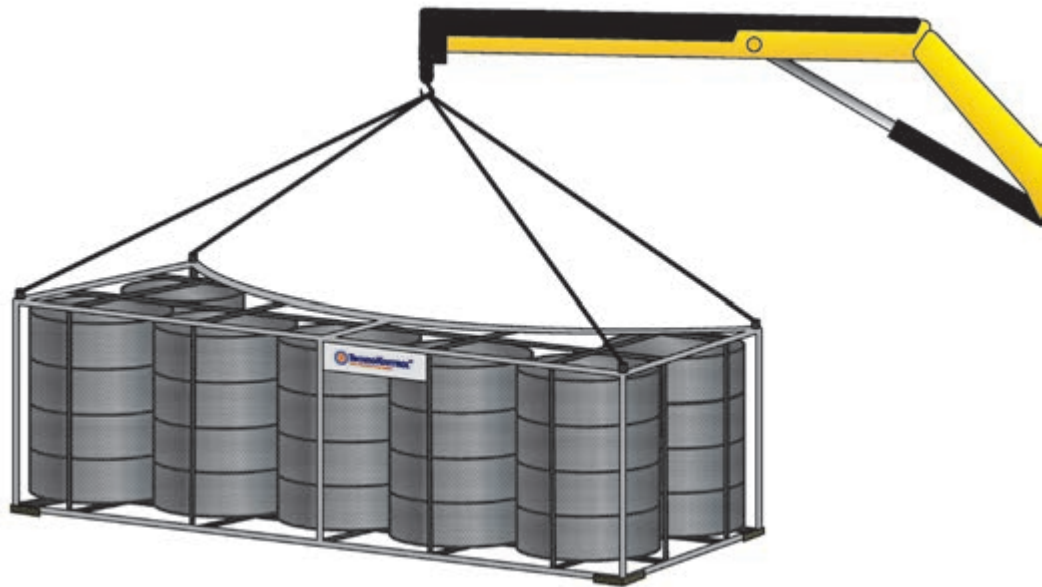


The TK Bund Area is mapped out in 3D thus allowing a color, numeric and precise cage plan design allowing when needed to withdraw, relocate, transport, have access to all sectors inside the TK Bund Area and/or to do maintenance, cleaning, QSSHE operations at anytime as being easily transportable by means of light weight lifting machinery, cranes or even by several members of staff due to its extreme light weight properties.





Top view of a bundled jumbo tank fitted with regular, angular and one-on-one TK-Cages.





*BUNDING IS A LEGAL REQUIREMENT
IN MANY COUNTRIES*

*LEGAL REQUIREMENT
COUNTRIES*



Bunding is a legal requirement in many countries particularly around tanks, storage vessels and other plant that contain liquids which may be dangerous or hazardous to the environment.

Particular examples which receive specific attention in the UK, the rest of Europe and the USA are oil and fuel storage tanks and transformers at electricity sub-stations which are filled with oil for cooling and insulation purposes.

It is reasonably easy to construct a “water-tight” bund around the base of a tank or vessel. A concrete base and a sealed wall of masonry, brickwork, concrete or even prefabricated steel provides the holding capacity.

Bunded oil tanks are generally a requirement from most insurance companies as opposed to single skinned oil storage tanks. Due to the safer oil storage solutions brought about by bunded oil storage tanks, some places in the UK can see the Environmental Agency require you to install bunded oil tanks.

Almost all regulations require a holding capacity of 110% of the largest tank within the bund or 25% of the total capacity of all the tanks within the bund whichever is the greatest. In addition further guidelines in some countries (e.g. the UK) recommend additional measures such as providing sufficient “free-board” or height of wall above the maximum holding capacity to accommodate dynamic factors such as surge in situations of major tank failure or storm driven waves in larger bunds. As a rule (and unless specific local laws prevail) most operators work to the 110% capacity guide.



QSSHE/QMSSHE Regulations







Extra Bund QSSHE Regulations

Engineering against loss of secondary and tertiary containment

This section represents interim guidance, as PPSLG will undertake further work to develop more detailed guidance on secondary and tertiary containment.

While priority should be given to preventing a loss of primary containment, adequate secondary and tertiary containment remains necessary for environmental protection in the event of a loss of primary containment of hazardous substances.

The failure of secondary and tertiary containment at Buncefield contributed significantly to the failure to prevent a major accident to the environment (MATTE).
Minimum expected good practice

Bund integrity (leak-tightness)

Bund wall and floor construction and penetration joints should be leak-tight. Surfaces should be free from any cracks, discontinuities and joint failures that may allow relatively unhindered liquid trans-boundary migration. As a priority, existing bunds should be checked and any damage or disrepair, which may render the structure less than leak-tight, should be remedied.

Fire-resistant bund joints

Joints in concrete or masonry bund walls must be capable of resisting fire. Existing bunds should be modified to meet this requirement. In addition to repairing any defects in bund joints, steel plates should be fitted across the inner surface of bund joints, and/or fire-resistant sealants should be used to replace or augment non-fire-resistant materials.

Masonry (brickwork and block-work) bund walls

On older sites masonry bund walls are still in use. Vertical expansion and contraction joints and penetration joints rely on sealants to keep the bund watertight. These may require improvement to fire resistance. In addition, where significant cracks in masonry joints have been repaired with flexible sealant, these may also require improvement.

Bund capacity

The minimum capacity for bunds containing tanks in scope at existing installations is 110% of the largest tank.









Firewater management and control measures

Site-specific planning of firewater management and control measures should be undertaken with active participation of the local Fire and Rescue Service, and should include consideration of:

- Bund design factors, such as firewater removal pipework, aqueous layer controlled overflow to remote secondary or tertiary containment (for immiscible flammable hydrocarbons);
- Recommended firewater/foam additive application rates and firewater flows and volumes at worst-case credible scenarios;
- Controlled burn options appraisals. Well-planned and organised emergency response measures are likely to significantly reduce the potential duration and extent of fire scenarios, and so reduce firewater volumes requiring containment and management. Site-specific planning of firewater management and control measures should be undertaken with active participation of the local Fire and Rescue Service, and should include consideration of:
- Controlled-burn options appraisal, and pre-planning/media implications.

EU-UK Environmental Oil Storage Regulations

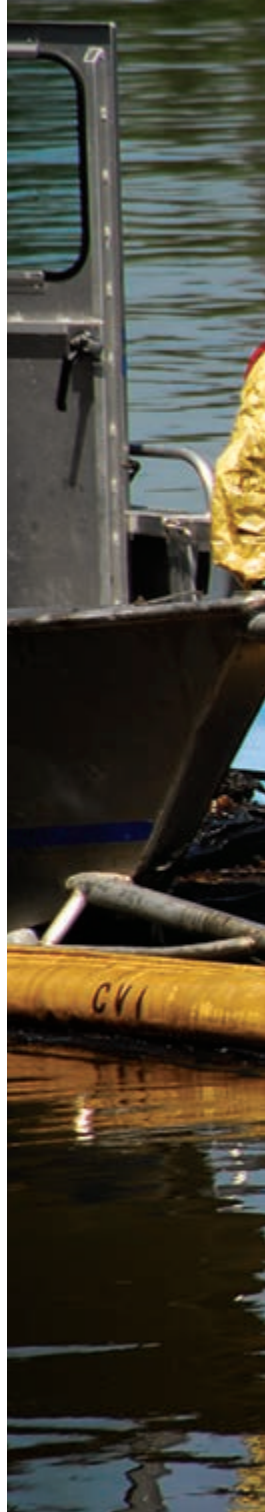
The Oil Storage Regulations apply to all new installations in the UK- (both domestic and commercial). Oil is the commonest pollutant in the UK, accounting for one quarter of all incidents. These guidelines are intended to help reduce pollution caused by inadequate storage of oil in above ground oil storage tank installations.

Your environmental regulator can serve on you an 'anti pollution works notice' if your site gives rise to, or is at risk of giving rise to, pollution of surface waters or groundwater. This notice will require you to undertake remedial action.

Many drains lead directly to rivers, streams or lakes. If you allow oil to enter these drains, it has the same effect as pouring it directly into the watercourse.

Oil is poisonous to fish and other wildlife and it smothers plants. Just two liters of oil could seriously pollute the volume of fresh water needed to fill an Olympic-size swimming pool and make it undrinkable.

You may be prosecuted and fined if oil from your site enters the ground or watercourses. And you may have to pay substantial clean-up costs. The Oil Storage Regulations are designed to prevent oil spills.





Does your installation require bunding?

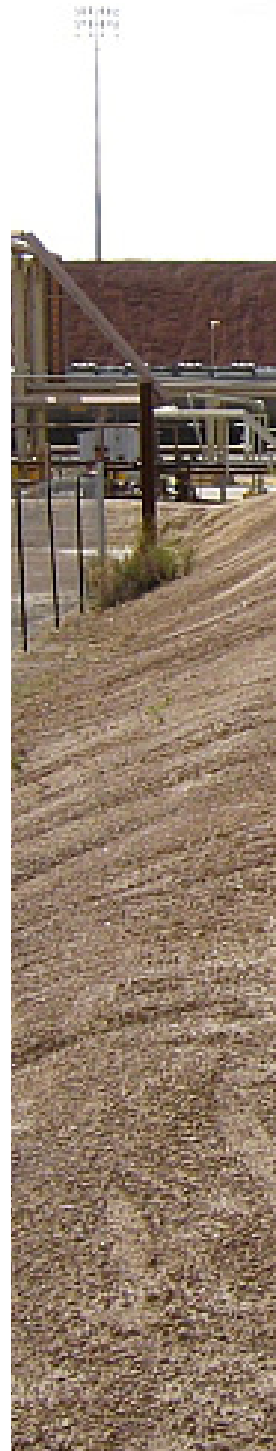
Is Secondary Containment of Oil a Legal Requirement?

Oil storage Regulations Definition: Secondary Containment, also often referred to as a bunded fuel storage tank, under the Oil Storage Regulations, an oil storage tank which qualifies should be contained within a secondary containment system totaling no less than 110% of the storage tanks full capacity, a bunded oil tank.

Other factors which require a Bunded Tank

Can you see the storage tank vent? If not you are required to bund the tank. An Overfill Prevention Valve will also need to be fitted in this instance.

You should also provide secondary containment (Bunded Tank) if the oil storage tank falls within a 10m of a water course (stream etc). Also use secondary containment if within 50m of a potable water supply or where spillages could run into drains or reach controlled waters.





Private Homes/Commercial Building Regs

A fire could be started by a fuel storage tank and its contents, However it does need to be protected from a fire that may originate nearby.

For example, tanks should be sited:

- On a solid base, level and at least 42mm thick, that extends a minimum of 300mm around the footprint of the tank
- 1800mm away from non-fire rated eaves of a building
- 1800mm away from openings (such as doors or windows)
- 1800mm away from any appliance flue terminals
- 1800mm away from a non-fire rated building or structure (i.e.: garden shed)
- 760mm away from non fire rated boundaries (i.e. wooden fence)



If it is not possible to meet these requirements, a fire rated barrier with at least 30 minutes protection should be provided, extending 300mm higher and wider than each applicable face of the tank.

OFTEC recommend that non domestic tanks equal to or below 3500L capacity should be located a minimum of 2m away from any buildings or boundaries. (6m for tanks above 3500L capacity).

If this is not possible, walls or barriers of at least 60 minutes resistance which extend 900mm beyond each applicable face of the tank should be used. (120 minutes rating for tanks above 3500L capacity).





Planning Permission

Domestic users will need to apply for planning permission to install a heating oil tank when:

- Greater than 3500L capacity
- Higher than 3m above ground level
- Nearer to the public highway than the closest applicable corner of the property*

Planning permission is also required for any domestic storage tank for fuels other than for oil fired heating applications (i.e.: LPG).

* does not apply if proposed site is greater than 20m from the nearest public highway

If you are installing an oil tank and/or connecting pipe work and you employ an installer registered with one of the related competent person schemes, you will not need to involve a Building Control Service

Commercial Applications

The Environment Agency is able to impose uncapped fines on anyone who causes any spill, it is not necessarily the responsibility of the site owner as it is the polluter who pays.

Other Requirements

It is important that the oil or fuel storage tank is inspected annually.

Section 5.1 (b) iii of the above regulations also states that all oil tanks should be labeled with information on how to respond to a leak.

Section 7 of the PPG26 pollution prevention guidelines states: "Spill kits containing materials such as oil or chemical absorbents and personal protective clothing should be on site".

Remember

The Environment Agency is able to impose uncapped fines on anyone who causes any spill, it is not necessarily the responsibility of the site owner as it is the polluter who pays.













TK-QMSSHE/QSSHE GLOBAL CERTIFICATION

TK-QSSHE / TK-Quality Security Health & Environment
Petrol Chemical Industry



TechnoKontrol
WHERE YOUR SAFETY IS OUR PRIORITY



QSSHE

QUALITY SAFETY SECURITY HEALTH ENVIRONMENT

2017

**Petrol Chem
Compliance**

Petrol Chemical Industry Compliance Certificate

TechnoKontrol has presented the new 2017 certificate, seal and logos for the TK-QSSHE Petrol Chemical certification, especially designed for the Petrol chemical, strategic, national security fuel-energy reserves and strategic infrastructures operators.

TK-Quality Security Health & Environment Petrol Chemical Industry Compliance Certification

Due to the increase of the terrorist risk in strategic locations, pipelines, fuel storage facilities, refineries, power stations, airports, seaports, TechnoKontrol has reached an agreement with many of the top European Operators, Government authorities, insurers and the security services to begin the issuance of the new TK-QSSHE Certification Directive in which the incorporated corporations, operators, establishments have or are in the process of protecting their operational assets including fuel storage, power plants with the recommended safety and security technologies to guarantee the maximum levels of protection for their guests, clients, employees and corporate assets.

The terrorist risk levels ever increasing due to the simple physical accessibility, low levels of fixed security protection standards, fabrication simplicity of homemade explosive devices,(I.E.D) which can be made with gas cylinders, petrol bombs and easily planted, activated, ignited in any hotel, shopping mall, airport fuel storage installations, which are all 100% refueled by fuel, gas, LNG, truck tankers.

Any truck fuel tanker, commercial fuel gas tank, fuel deposit with a normal capacity of 30,000 liters of fuels, LNG, heating gas, having in the event of an ignition, spark, armed attack, bullet shot, accident, a thermal, blast, fire, explosive and destruction range/power of a 200,000 TNT explosive and even the simple 30kg home gas cylinder having over 200 kilos of TNT blast.







Technokontrol Safety &
Certification

COMPAN TK-QSSHE STANDARDS FOR P

Technokontrol certifies that the QSSHE Management System
protected with the most advanced Quality, Safety, Security
accordance of the Safety and Security

Location **City, Country**

Date **01 January 2017**

Expiry Date **01 January 2018**

C.E

(This company has been fitted with the most advanced safety and security
accidental, criminal/terrorist attacks in their fuel storage and operations
(USA-National Fire Protection Association/ Standards)

oKONTROL
SAFETY IS OUR PRIORITY

Security Technologies
ifies

COMPANY NAME
TECHNOKONTROL CHEMICAL INDUSTRIES

Systems and Directives have been assessed and having installed,
Security, Health & Environment (QSSHE) Technologies with
by Directives issued by Technokontrol.

S.O.

Chief Engineer

Security technologies to prevent the risk of energy, fuel, gas chemical,
Industrial power installations in accordance with TK Safety and the NFPA
(Standard of Explosion Prevention 2014) Directives).





As these storage installations, deposits, fuel tanks being mostly in open air locations and next to the cities, towns, transport networks, public locations and services, industries, commerce the need of anti-explosive protection being paramount and using TechnoKontrol Safety Technologies allowing the full deactivation, null ignition or even non-explosion of these petrol chemical, national strategic networks and infrastructures, storage facilities regardless of the amount, type of the stored, used fuels, thus rendering any accidental or intentional incident null and fully protecting the population, employees, environment and the operators asset/establishment against these types of incidents.

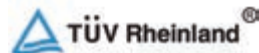
The issuance and the certification will only be issued with full TechnoKontrol technical compliance and following top global USA & EU Safety, security and protection directives as set out by the USA-NFPA (National Fire Protection Association Codes 2008/2014 for the Prevention of Explosion Acts). All installations, services, maintenance programs and products being fully insured by Zurich Insurance.

TK-QMSSHE/QSSHE GLOBAL CERTIFICATION
PETROL CHEMICAL INDUSTRY





Certificates





HAZLOC

Architects
Engineers
Building
Officials
Section



SOUTHWEST



National Fire Protection Association
The authority on fire, electrical and building safety

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WHERE YOUR SAFETY IS OUR PRIORITY

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