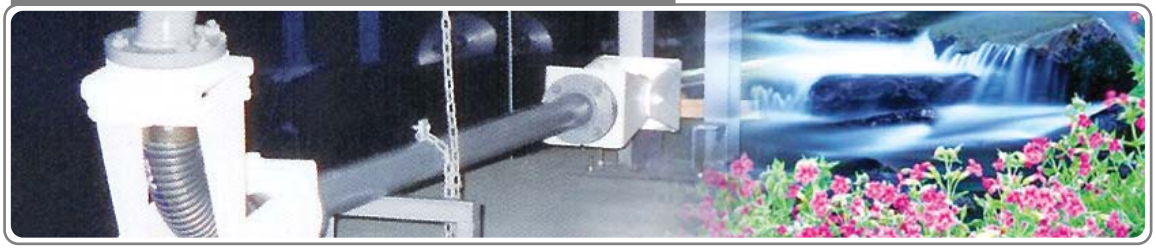
WB produces >>>

1. EXTERNAL FLOATING ROOF SEAL SYSTEMS

2. ALUMINUM DOME COVERS

3. INTERNAL FLOATING ROOF SYSTEMS

4. 3+1" FLOATING ROOF DRAIN SYSTEMS



5. TANK FITTING PRODUCTS

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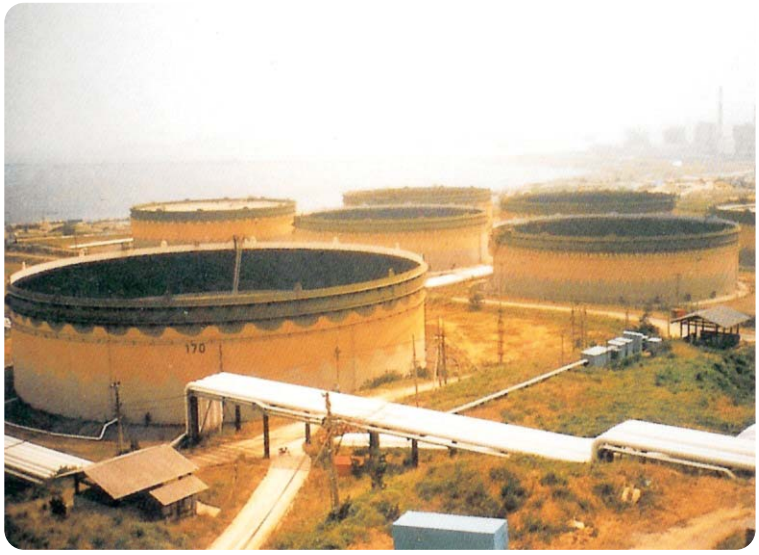


• WB-1 PANTOGRAPH TYPE MECHANICAL SHOE SEAL

• TECHNICAL INTRODUCTION

PANTOGRAPH TYPE MECHANICAL SHOE SEAL is the same type as CBI SR-1. It is the most widely used seal design on floating roof tanks and has been uesd tanks ranging from 6.0m to 107.0m in diameter string all crude oil & refined oil products.

Picture for WB-1 PANTOGRAPH TYPE MECHANICAL SHOE SEAL

• ENGINEERING DETAILS

· The weighted pantograph system ensures that the sealing ring is held in constant contact with the tank shell.

· Shoe plate is designed with Flexures built into the sheet at intervals of approximately 550mm to ensure conformity with the tank shell and allow expansion and contraction.

· The lower part of shoe plate is under product for restraint form vapour retention. The upper part is located above rim to ensure rainwater drains on to the pontoon.

· The space between shoe plate and roofs is closed by a vapour tight flexible continuous seal material and shunt set up at intervals of 3meters or less to maintain electrical continuity between roof &tank shell.

• ACCESSORIES WAX SCRAPER

Crude oil tank that contains the ingredient of wax scraper devices can easily be attached to the outside of shoe plate

All the WB-50 SECONDARY SEAL SYSTEM is designed to suit for WB-1 PRIMARY SEAL.

In case of using WB-50 SECONDARY SEAL, it can reduce the vapour loss maximum 98% and it is the best secondary seal design in the world oil market.

• TECHNICAL DATA

· RIM SPACE : 200mm±100mm but larger rim space can be possible.

· AROMATIC SERVICE : 100%

· TYPICAL MATERIAL SPECIFICATION

: Continuous seal- WB/Special PU or others materials

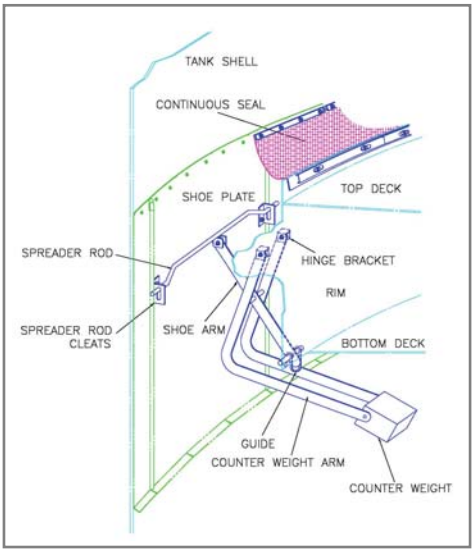
· Other special polymer materials are also available

· SHOE PLATE : Galvanized steel or Stainless steel.

· TYPICAL SERVICE LIFE : 10~25 years.

· WEIGHT OF COMPLTE SEAL : 45Kgs/M

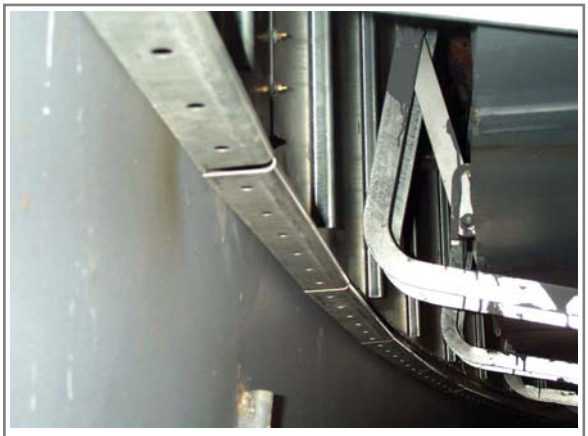
· NOTE : WORLD WIDE SEAL EXPERIENCE LISTS ARE AVAILABLE UPON REQUST.



• Field Erection works for WB-1 PANTOGRAPH TYPE ME MECHANICAL SHOE SEAL

The Wax Scraper seal is ready to be installed at China oil company between tank shell and pontoom

The installation of continuous seal (Tank Dia 60M-China oil company)



The end section of WB-1 mechanical shoe seal and counter weight

Completely assembled

Shoe Plate before Installation

Shoe Plate after Installation

• WB-2 PLATE SPRING TYPE MECHANICAL SHOE SEAL

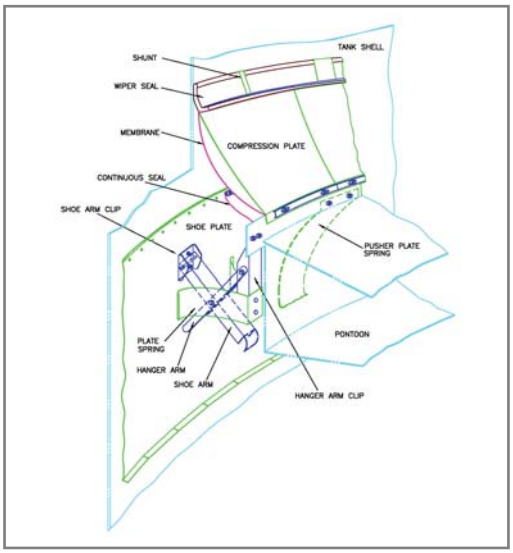
During last 10years, almost of oil companies want to use economic and simple design seal, which is Mechanical Shoe Seal.

We, World Bridge, started to produce PLATE SPRING TYPE MECHANICAL SHOE SEAL, which is very easy to apply to Floating Roof. It is designed based on our tank seal engineering and installation experience during last 15 years.

Our Mechanical shoe seal has some advantages.

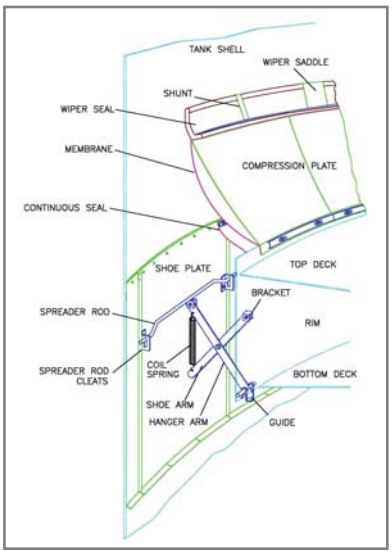
The first, you can install all components of seal by bolting without any hot work such as welding.

The second, we can supply our Mechanical Shoe Seal in very good price, which is 20~25% cheaper than pantograph type Mechanical Shoe Seal



- RIM SPACE : 200mm
- AROMATIC SERVICE : 100%
- TYPICAL MATERIAL SPECIFICATION : Galvanized steel or Stainless steel
- PLATE SPRING MATERIALS : Stainless steel 301
- TYPICAL SERVICE LIFE : 10~20years
- WEIGHT OF COMPLTE SEAL : 40kg/M

• WB-3 COIL SPRING TYPE MECHANICAL SHOE SEAL



This Seal design is basically same with WB-1 PANTOGRAPH TYPE MECHANICAL SHOE SEAL, but Coil Spring push Shoe PLate to tank shell instead of Counter Weight in WB-1 PANTOGRAPH TYPE MECHANICAL SHOE SEAL.

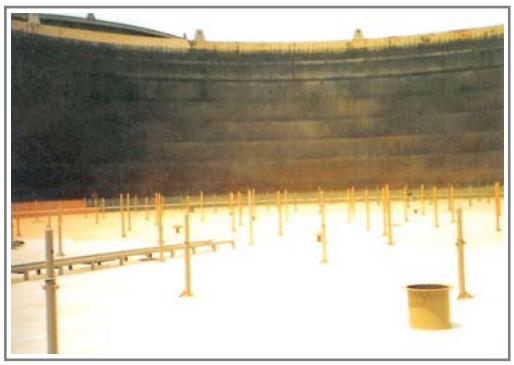
We are able to install Coil Spring type Mechanical Shoe Seal assembly easier than Counter Weight type Seal assembly without hot welding works.

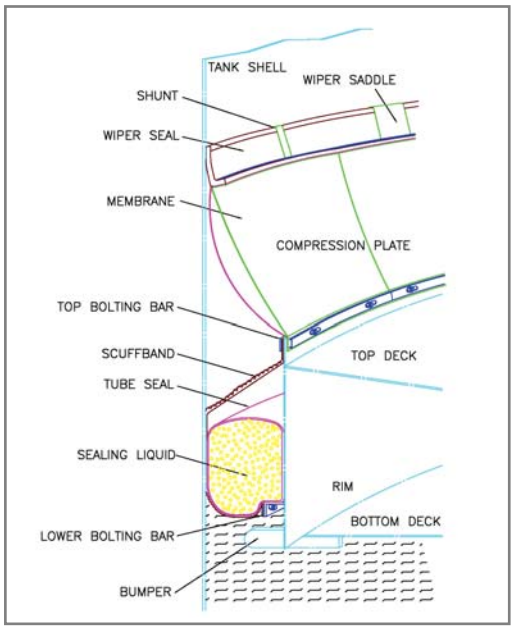
- RIM SPACE : 200mm
- AROMATIC SERVICE : 100%
- TYPICAL MATERIAL SPECIFICATION : Galvanized steel or Stainless steel
- PLATE SPRING MATERIALS : Stainless steel 301
- TYPICAL SERVICE LIFE : 10~20years
- WEIGHT OF COMPLTE SEAL : 33Kg / M

• TUBESEAL LIQUID FILLED SEAL

• TECHNICAL INTRODUCITON

The TUBESEAL System is a Liquid Mounted type Seal and this seal type prefer to an area of the Middle East, Europe & South-East Asia. This seal is used on tank from 6.0m to 107.0m in diameter and can be used to all of the tank to the full range of crude and refined petroleum products.





• ENGINEERING DETAILS

- The TUBESEAL divided a separate scuff band & tube.
- The scuff band is processed consecutively and made from nylon fabric coated with a hardwearing electrometric material to withstand contact with the roughest tank shell.
- The TUBE size can be varied from 250mm to 350mm & this is settled by tank size or rim apace.
- The tube is normally produced in one continuous length but can be supplied in separate sections.
- The tube is located between the scuff band and the roof rim.
- The Liquid Filled Tube gives pressure to scuff band when the tank is in service, and must be maintained approximately at intervals of 200mm from tank shell.
- At present it has proved more practical & economical to fit secondary seals such as the WB-50 or WB-50E over Liquid filled Tube Seal systems.

• ACCESSORIES SECONDARY SEAL

All the WB-50 Secondary Seal can be installed with the TUBESEAL Primary Seal system, and also can be used instead of weathershield.

WAX SCRAPER

A Wax scraper system installed below the roof, remove wax deposits from the tank shell when waxy crude oils are being stored.

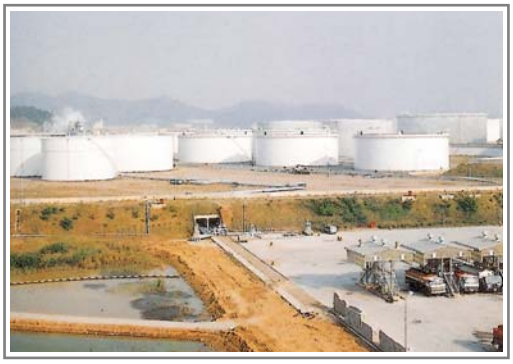
• TECHNICAL DATA

- RIM SPACE : 170mm±80mm (Lager nominal rim spaces can be accommodated)
- AROMATIC SERVICE : 75% (With special materials available to give service 100% products)
- MATERIAL SPECIFICATION : WB/Special Nylon fabric coated with special PVC Nitrile elastomer.
- THICHKNESS : SCUFF BAND – 4.5mm min.
- TUBE : - 1.5mm min.
- TYPICAL SERVICE LIFE : 15~20 years.
- WEIGHT OF COMPLTE SEAL : 25Kgs/M (Including weathershields)

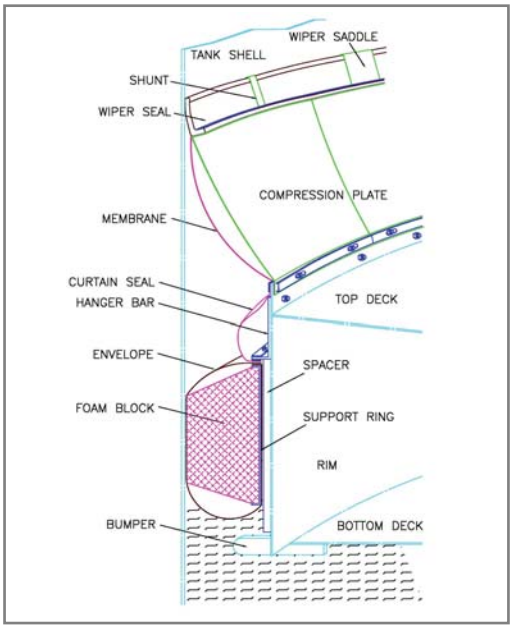
• TECHNICAL INTRODUCTION

WB-7 ELASTICITY FOAM SEAL is equal to the type of CBI SR-7 as Product-Mounted Seal.
This seal design has been used on tanks from 12m to 107m in diameter containing the full range of Crude & Refined products, though it is unsuited waxy crude

• ENGINEERING DETAILS



- This type of Seal is designed to enable to installation and removal works to be carried out on the top of the Roof.
- The Sealing effect between Roof & Tank shell is perfect achieved by use of special Trapezoidal Polyurethane Foam section.
- Foam Sections are fixed to endless Seal Support Ring Foam & Support Ring is covered by envelope. Especially, Envelope is made form Synthetic Rubber Coated Nylon Fabric.
- The hanger Bars hold the correct position with the bottom of the Seal in contact with the stored product.
- A Seal Envelope is used highly abrasion-resistant coated fabric material to obtain an efficient soft sealing effect.
- Weathershield can be installed as illustrated to help reduce the amount of rainwater entering the product, but at present it has proved more practical & economical to fit WB-50 Secondary Seal.
- As the WB-7 FOAM SEAL is Product Mounted type and installed in contact with the stored liquid, therefore, sealing effect is very high.



• ACCESSORIES SECONDARY SEAL

All of the WB-50 Secondary Seal designed to be used with the WB-7 Primary Foam Seal.

• TECHNICAL DATA

- RIM SPACE : 200mm±100mm
- AROMATIC SERVICE : 100% (Some special chemicals may require modified material)
- MATERIAL SPECIFICATION : Two alternative standard Envelope materials are commonly used.
  -WB/Special Polyurethane coated nylon fabric 1.0mm thick
  -WB/Special polymer PVC nitrile elastomer coated nylon fabric 1.5mm thick.
- TYPICAL SERVICE LIFE : 8 to 20 years
  The seal metal parts can almost be re-used, therefore only the envelope and foam are normally replaced.
- WEIGHT OF COMPLTE SEAL: 35Kgs/M

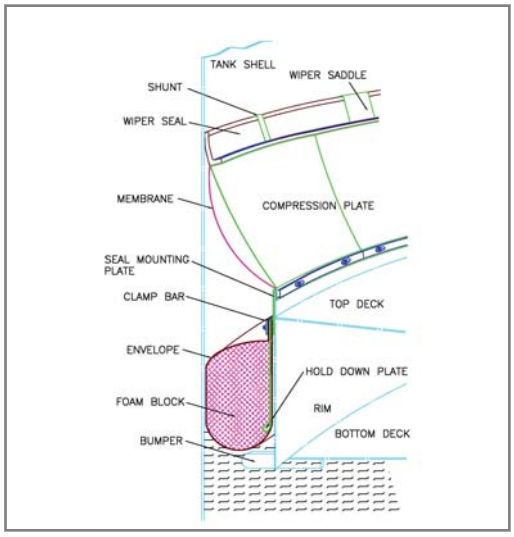
• GRAVER FOAM SEAL

• TECHNICAL INTRODUCTION

The GRAVER FOAM SEAL can be applied to Product-Mounted or Vapour-Mounted type on the external floating roof & internal pandeck as same as Deltaseal. This seal is used on tanks from 6.0m to 91.0m in diameter and can be applied to all type of storage tank except waxy crude.

• ENGINEERING DATAILS

· This seal is designed to enable installation & removal on the roof as same as another foam seal.
· The sealing effect between roof and tank shell is achieved by octagonal foam section. The foam section is fixed in position by hold down plate.
· The position of the seal on Product-Mounted or Vapour-Mounted type is determined by the top bolting position.
· The hold down plate & foam section are covered by synthetic Rubber coated nylon seal envelope.
· Envelope is produced highly abrasion resistant coated fabric material to obtain the most efficient soft sealing effect.
· Weathershield can be installed as illustrated to help reduce the amount of rainwater entering the product, although at persent it has proved more practical and economical to fit Secondary Seal instead of Weathershield.



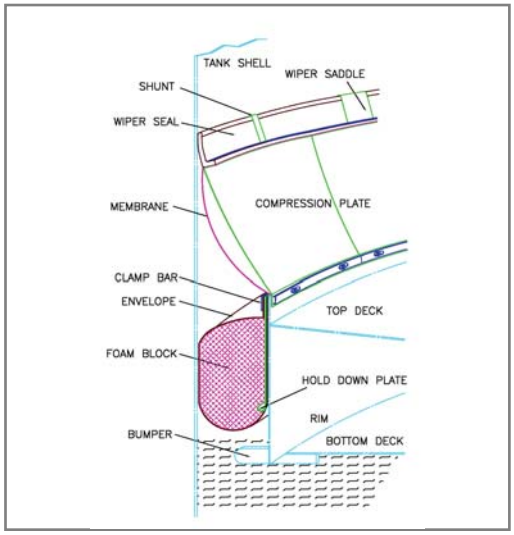
Product Mounted (contacted)Type

• ACCESSORIES

WB-50 Secondary Seal designs can be replaced with Weathershield.

• TECHNICAL DATA

· RIM SPACE : A variety of seal sizes are available to accommodate nominal rim spaces between 100mm and 250mm
· AROMATIC SERVICE : 100% (Some special chemicals may require modified material)
· MATERIAL SPECIFICATION
: Two alternative standard Envelope materials are commonly used.
-WB/Special Polyurethane coated nylon fabric 1.0mm thick
-WB/Special polymer PVC nitrile elastomer coated nylon fabric 1.5mm thick.
· TYPICAL SERVICE LIFE : 8 to 20 years
· WEIGHT OF COMPLTE SEAL : 20Kgs/M(Including weathersheld)



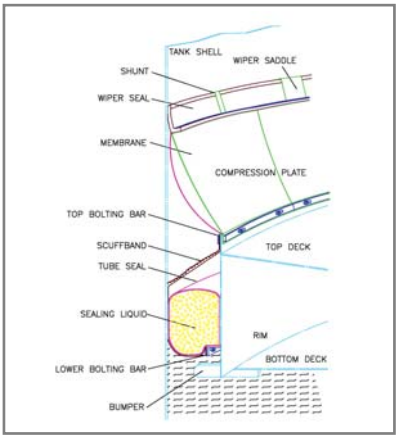
Vapor Mounted (contacted)Type

• WAX SCRAPER

• FOR TUBE SEAL

· The Wax scraper device used for the Tube Seal is fixed below the roof and is designed with a series of over lapping scraper blades, each of which is radiuses to suit the tank shell. The scraper plates are maintains in contact with the shell by a hair pin spring.

· The guide ensure that the scraper plates maintain a constant angle of contact with the tank shell as the rim space varies.

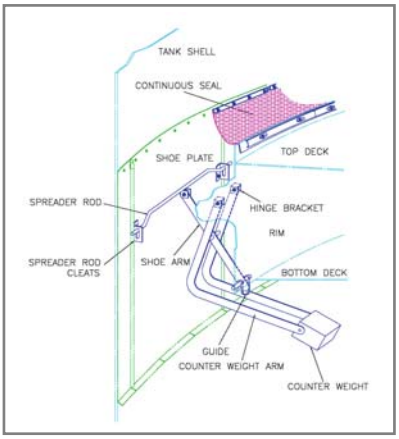


• FOR WB-1 PANTOGRAPH TYPE MECHANICAL SEAL

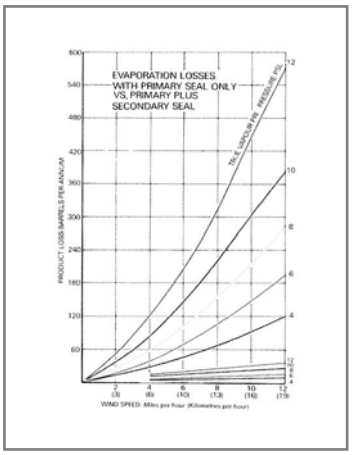
· Wax Wcraper sole plates are attached to the outside of the WB-1 Shoe Plate as shown. The galvanized steel scrapers have a blade formed along the lower edge which removes the wax from the tank shell as the roof level changes.

· The scraper is kept in contact with the tank shell by the action of the pantograph assembly on the sealing ring.

· The top of the wax scraper plates are angled away from the tank shell and adjacent plates are connected with a rubber seal to form a reservoir to collect wax falling from the shell



• INSTRUCTION WB-50 SECONDARY SEAL



· As the left photograph, this seal can be reduce vapour loss up to 98%

· Rapid payback within 2-3years

· UV and weather resistant type of synthetic rubber

· 65mm contact depth and excellent sealing effect.

· Using continuous vapour barrier membrane, protect vapour loss from the compression plate

· Excellent sealing effect by spring type stainless compression plate or galvanized steel parts.

· Stainless steel shunts for electrical shock.

· Installation with tank in service.

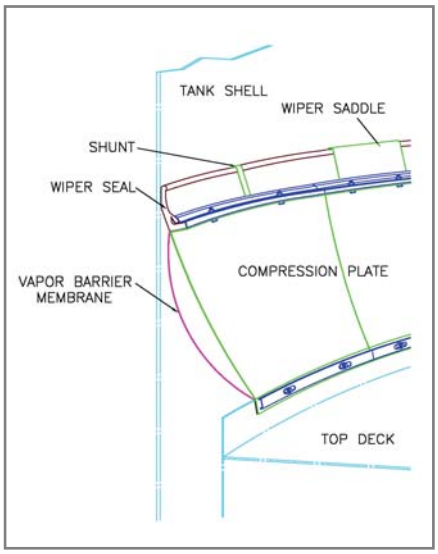
· Minimal maintenance – This graph shows saving calculated using API Bulletin 2517 edition 2 for 100ft diameter tank with Mechanical Shoe Seal on refined product service.

• WB-50 SECONDARY SEAL

• TECHNICAL INTRODUCTION

The WB-50 Secondary Seal is a rim mounted seal
Suitable for external Floating Roof Tanks from 7.6m to 120m in diameter.
This seal can be used on tanks containing all types of crude and refined products.

• ENGINEERING DATAILS



· The WB-50 Seal is designed to be installed whilst the tank is in service. The seal incorporates a compression plate, synthetic rubber wiper and a vapour barrier membrane.
· The compression plate can be made from either galvanized steel or stainless steel. The vapour barrier membrane is manufactured from polyurethane coated nylon fabric with very low vapour permeability properties.
· The synthetic rubber wiper seal has been extensively tested and has an expected service life in excess of 10 years.
· The seal design is such that oil of the fixings are on the outside of the seal, i.e. the tank shell side is completely smooth,
· The smooth outside surface of the seal ensures that the risk of damage is minimized if the roof is floated above the tank shell.
· The seal can be custom-built to accommodate any tank out of roundness or shell bulges.
· The synthetic rubber wiper seal maintains a contact of approximately 65mm to the tank shell

• COST EFFECTIVENESS

The cost of installing a WB-50 Secondary Seal will normally be covered with in a period of 2 to 3years. The higher the average wind speed, the shorter the recovery period. More details can be supplied relating to the WB-50 Secondary Seal.

• TECHNICAL DATA

· RIM SPACE : Any nominal rim space can be accommodated.
· AROMATIC SERVICE : 100%
· MATERIAL SPECIFICATIONS : Details will be supplied upon a request
· TYPICAL SERVICE LIFE : 10-20 years.

• WB-50E TYPE SECONDARY SEAL

• TECHNICAL INTRODUCTION

The economic type of WB-50E TYPE SECONDARY SEAL has developed to provide equal service life and performance works against WB-50E TYPE SECONDARY SEAL.

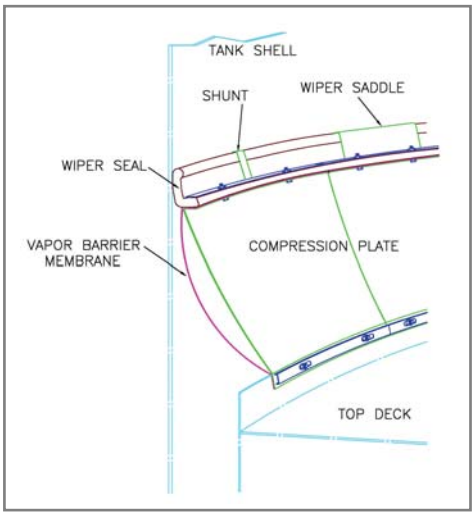
WB-50E TYPE SECONDARY SEAL can be used on oil tank products including light oil & heavy crude oil.

• ENGNEERING DETAILS

· Basic design of WB-50E SECONDARY SEAL is almost same with WB-50 SECONDARY SEAL.

· We developed WB-50E SECONDARY SEAL to achieve economic type of seal design work, which is required from our customers.
Customer knows well the advantage of our WB-50 type SECONDARY SEAL through their long time operating experience. Our customer ask use to supply more economic type secondary seal which has same advantage of WB-50 type SECONDARY SEAL.

· We, World Bridge, had studied to develop new seals which is able to meet customer's requirements.
Finally, we could make WB-50E SECONDARY SEAL, and it was testify because of good performance our technology & a lot of experience for a long time.



• COST EFFECTIVENESS

The cost of installing a WB-50E Secondary Seal will normally be covered with a period of 1 to 2years. The higher the average wind speed, the shorter the recovery period. More details can be supplied relating to the WB-50E Secondary Seal.

• TECHNICAL DATA

· RIM SPACE : Any nominal rim space can be accommodated.

· AROMATIC SERVICE : 100%

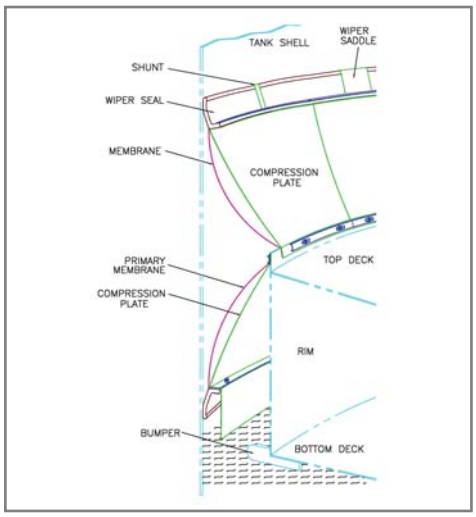
· MATERIAL SPECIFICATIONS : Details will be supplied upon a request

· TYPICAL SERVICE LIFE : 10-20 years.

• WB-100 DOUBLE SEAL

Double seal is a improved seal design based on WB-50 Secondary seal.

• ENGINEERING DETAILS



- Synthetic rubber wipers both primary and secondary seal keep up a contact depth of 65mm. The continuous pressure exerted by the Double compression plates helps keep the roof centered.
- The installation of the seal can be carried out from the top of the roof without any hot work being required, and therefore the seal can be installed on tanks whilst they remain in service.
- Double sealing systems have been evaluated in the U.S.A and are classified by the U.S. Federal Environmental Protection Agency as being equivalent to a vapour mounted primary seal and secondary seal combination.
- Like WB-50-Secondary Seal, WB-100 Double Seal is made of stainless steel or galvaneized steel for compression plate and other metal parts.
- The seal can be installed with the two compression plates fitted on a common set of bolts as shown on the sketches or separate fixing points or “double nutting” techniques can be used.
- The sketches of the WB-100 Seal show the simplest seal design to which can be added a weighted skirt which dips into the stored product further reducing the produced losses.

• WB-50 SECONDARY SEAL A/S TEST PROGRAM

As the request of major oil company, WBICL carried out a detailed simulation test of the WB-50 Secondary Seal in the rough tank shells.

During six weeks, the test was cycled over a tank shell under various conditions representing the equivalent the 10 years normal operation. The result was that the thickness of the wiper seal was reduced by less than 5persent. Even allowing for other factors affecting service life, such as atmospheric ageing and ozone attack, it can well operated more than 10years under any condition adverse.

MATERIAL SPECIFICATION

MATERIAL	POLYMER COATING	THICK	F/I	A/R	COMMENTS
WB/NV 100/A	PVC/NITRILE	2.4	Special Fabric Material	100%	
WB/NV 130/A	PVC/NITRILE	3.1	Special Fabric Material	100%	
WB/PC 100/A/AS	NEOPRENE	2.4	Special Fabric Material	85%	ANTISTATIC
WB/PC 130/A/AS	NEOPRENE	3.1	Special Fabric Material	85%	ANTISTATIC
WB/FE 80/A	FLUOROELASTOMER	2.0	Special Fabric Material	100%	*S/SERVICE
WB/NV 60/N	PVC/NITRILE	1.5	NYLON	100%	
WB/NV 100/N	PVC/NITRILE	2.4	NYLON	100%	
WB/PC 60/N	NEOPRENE	1.5	NYLON	85%	
WB/FE 30/N	FLUOROELASTOMER	0.75	NYLON	100%	S/SERVICE
WB/NV 60/G	PVC/NITRILE	1.5	GLASS	100%	
WB/BU 60/N	BUTYL	1.5	NYLON		S/SERVICE
WB/NV 400/N	PVC/NITRILE	1.5	NYLON	100%	TUBE
WB/NV 400/N	PVC/NITRILE	4.5	NYLON	100%	SCUFFBAND
WB/NV 500/N	PVC/NITRILE	1.7/4.5	NYLON	100%	WB-5 SEAL
WB/PU 30/N	POLYURETHANE	0.75	NYLON	100%	
WB/PU 40/N	POLYURETHANE	1.0	NYLON	100%	
WB/NV 60/N	PVC/NITRILE	1.5	NYLON	85%	
WB-FE 30/N	FLUOROELASTOMER	0.75	NYLON	100%	
WB/PU 40/N/AS	POLYURETHANE	1.0	NYLON	100%	ANTISTATIC

* Special service

WB/F 18/9
POLYURETHANE FOAM CUT TO THE REQUIRED CROSS SECTIONAL SIZES.
A NUMBER OF OTHER MATERIALS ARE ALSO AVAILABLE FOR SPECIAL APPLICATIONS.