



TSURUMI PUMP

Application Reports - Issue No. 3 - December 2003

Tsurumi Manufacturing Co. is the world's biggest manufacturer of electrical submersible pumps.

Tsurumi's Kyoto Plant is the world's most modern submersible pump manufacturing plant.

Total manufacturing capability: 1.000.000 units per year.

Established in 1924 Tsurumi is one of the most experienced pump manufacturers.

Tsurumi is quality and durability.
Pumps for professional use.

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Oil rehabilitation, Vienna, Austria



The project:

Rehabilitation of an old oil refinery which was destroyed in World War II

Executing companies:

Consortium Altlast Mobil

G. Hinteregger & Söhne Baugesellschaft m.b.H.

The problem:

Floating oil on the surface of ponds must be sucked off.



Our solution:

Application of a submersible scum skimmer Type 4-FSP which due to its design generates a continuous suction flow.

By means of the adjustable floats suction depth can easily be adjusted (Fig. above). The Tsurumi scum skimmer takes the medium in only from the surface through a special suction inlet (Figure on right).

In the event of abrasive and corrosive utilization, stronger wear and tear will take place naturally in certain components. With regards to the above application wear and tear can take place mainly in suction plate, shaft sleeve, oil ring, mechanical seal, pump casing and discharge coupling. Depending on the working conditions the lifetime of those parts might vary significantly and can be shorter than the legal warranty period.

In this regard, please pay attention to our general conditions of sales (www.tsurumi-europe.com/english/GCS.htm) that we also send to you by mail on request.

Tunnel Burgholz, Wuppertal



The project:

Construction of a tunnel for road traffic

Executing companies:

Consortium Tunnel Burgholz

Baresel AG, NL Tunnelbau

G. Hinteregger & Söhne Baugesellschaft mbH

The problem:

Pumping off the water arising during underground tunnel heading.



Our solution:

Application of 25 Tsurumi submersible waste water pumps of series KTZ and KTV and KRS with agitator.

Figure above: KTZ45.5 in snore mode installed in traverse heading between the south and north tunnel. Figure on right: The final length of the southern tunnel is 1865m, that of the northern tunnel is 1787m.

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City railway tunnel, Bochum



Our solution:

Use of submersible waste water pump Type KTZ32.2.

Figure above:

Terraced finish of the roof section

Figure on right:

KTZ32.2 on snore mode at the breast.

The project:

City railway tunnel building lot 306

Executing companies:

Beton- und Monierbau Ges.m.b.H.
Heitkamp Rail GmbH

The problem:

Pumping off the water arising during mined underground tunnel heading.



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Consortium Kleine Emscher, Duisburg



Our solution:

The arising ground water is pumped off with a KRS2-69 pump, including all the sand contained. A 24-h on snore mode operation must be ensured.

The project:

Micro-tunnel pipe heading DN 3200/80m,
DN 2400/600m and DN 1400/120m

Executing companies:

Echterhoff GmbH & Co. KG
F.C. Trapp Tief- u. Straßenbau GmbH

The problem:

Pumping off or drainage of the arising ground water containing sand during pipe heading by open dewatering.



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City railway tunnel, Dortmund



The project:

Construction of the city railway tunnel at railway station Ostentor

Executing companies:

Wayss & Freytag Ingenieurbau AG
Oevermann GmbH

The problem:

Pumping off the water arising during mined underground tunnel heading.

Our solution:

10 Tsurumi submersible waste water pumps of series KTZ were used for drainage. In the illustration above one KTZ45.5 and one KTZ67.5 are shown on snore operation installed in the starting shaft. The tunnel is driven on two levels over a length of 1300m and a cross section from 36sqm up to 185sqm. Track 3 at level 21m under ground passes below the track 2 running at level 14m underground and surfaces between the tunnels for tracks 1 and 2.



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Tunnel project U3, Munich



The project:

Construction of underground tunnel Line 3 North, lot 1

Executing companies:

Consortium U-Bahn Linie 3 Nord
Ed. Züblin AG, Ndl. Tunnelbau
Ed. Züblin AG, Ndl. München
M. Bögl Bauunternehmung GmbH&Co. KG

The problem:

Pumping off the water arising during mined underground tunnel heading.





Our solution:

Use of 9 submersible waste water pumps of Type KTZ32.2.

Because of the highly calcareous water deposits occur in the pump hydraulics resulting in pump blocking. However, due to the mechanical seal positioned completely inside and the additional shaft protection sleeve with sealing ring the pump can be put quickly with little effort and without exchanging any wear parts back into operation again.

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Syphon construction under nature reserve Löcknitztal by micro-tunnelling



The project:

Pipe heading DN 1600 by micro-tunnelling with reinforced concrete driving pipes for passing under the nature reserve Löcknitztal near Kienbaum (Land Brandenburg) as protective pipe for a high-pressure gas pipeline DN 1100.

Client:

Ruhrgas AG/Verbundnetz Gas AG

Executing company:

Gildemeister Tief-, Stahlbeton- und Rohrleitungsbau GmbH&Co. KG, Berlin

The problem:

Pumping off the supporting liquid (bentonite suspension) used in the tunnel during pipe heading.

Our solution:

Application of a submersible pump Type KTZ35.5 connected with an accompanying pipe line DN 100 for continuous removal of the supporting liquid during the whole time of pipe heading. The pump was always positioned at the lowest point of the syphon and operated on snore mode.



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Gotthard basetunnel, Sedrun, Switzerland



The project:

Railway tunnel Alptransit Gotthard,
building lot 360

Executing companies:

Consortium Transco-Sedrun

Batigroup AG Tunnelbau

Frutiger AG

Impresa Pizzarotti &C.S.p.A.

The problem:

Pumping off the water arising during mined tunnel heading. The extraordinary challenge of the 'Sedrun section' with two parallel tunnels each 6.2km long is the penetration of zones of extreme geological difficulties and the supply to the building site through a mine shaft 800m deep.



At the foot of these shafts two parallel tunnels are driven using conventional methods to the north and to the south.

The tunnels are driven through rock of the Tavetscher Massif having little stability with 2000m capping, making the work extremely difficult. In addition, one of the two multi-function stations of the 57km long Gotthard basetunnel will be constructed within the Sedrun section.

Our solution:

Application of so far 15 Tsurumi submersible waste water pumps for draining.

Pump series used: KTZ, KRS, KTV, LH

From top:

Fig. 1: View into the shaft

Fig. 2: KRS2-100 for sludge pumping

Fig. 3: KTV2-37 flying pump in the area of the tunnel front

Fig. 4: KTZ47.5 in collecting basin



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HeidelbergCement AG, Burglengenfeld



The project:

Use of pumps at the works site.

Executing company:

HeidelbergCement AG, Werk Burglengenfeld

The problem:

Frequently arising ground water in cable shafts and in parts of the production lines.

Our solution:

Use of Tsurumi submersible waste water pumps for pumping off the arising ground water.



from top:

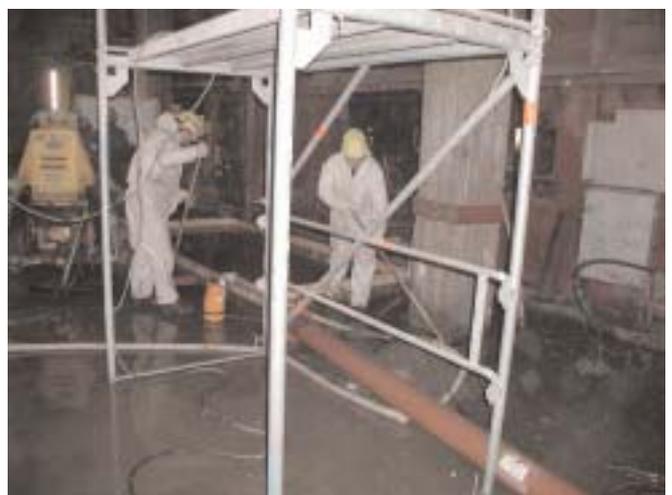
Fig. 1:

Use of Tsurumi submersible waste water pumps KTVE2.75 for pumping off the ground water which has collected in the various shafts. Trouble-free operation is guaranteed due to the level control integrated in the pump. The operate point can be adjusted individually by extension of the electrode.



Figs. 2-4:

Use of Tsurumi LSC-4 pumps for removing the water inside the cable shafts down to 1mm. An integrated flap trap permits operation of the pump on 24-h snore mode, it takes in always automatically.



ICE railway track Airport Cologne-Bonn



The project:

Underground railway track for linking Cologne-Bonn airport, Germany

Executing companies:

**Consortium Flughafenankündigung Köln/Bonn Los 3
E. Heitkamp GmbH**

Wayss & Freytag Ingenieurbau GmbH

Bauer Spezialtiefbau GmbH

F. C. Trapp AG

Dewatering with 24-h pump duty by:

Smet GWT N.V., Dessel, Belgium

Biergans Pumpen-Vertrieb GmbH, Duisburg

The problem:

Pumping off the water arising during underground tunnel heading, lowering the ground water level over a large area.

Our solution:

Deep wells were built in the area in which submersible waste water pump were installed. This allowed to lower the ground-water table to the lowest possible level.



from top:

Fig. 1:
Tunnel entrance Hermann-Lönsstraße, 1st section of excavation

Fig. 2:
KTZ32.2 for sludge pumping



Fig. 3:
Support of the drain line by a pipe bridge, 2nd section of excavation

Fig. 4:
View into the tunnel, 3rd section of excavation





Fig. 5, on left

Water drainage with KTZ23.7 on snore mode, installation in drainage collection shaft

Figure 6, on right:

Water drainage with KTZ67.5 on snore mode, installation in drainage collection shaft



Fig. 7, on left

Well pump LH23.0W installed in deep well on snore mode

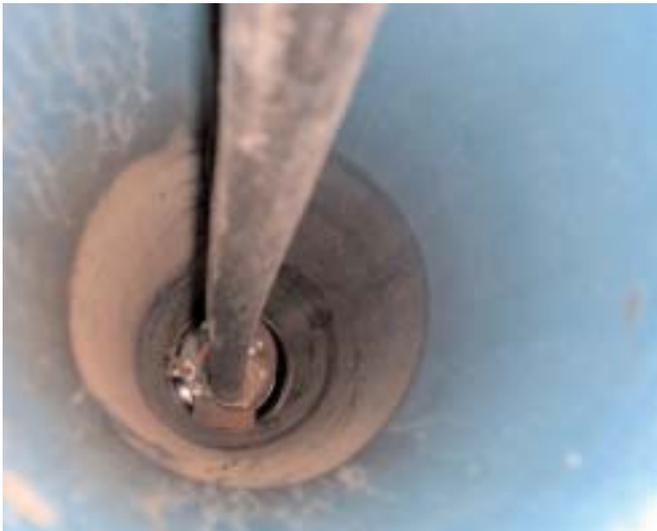


Figure 8, on right:

Tunnel exit Kriegerstrasse, view in direction towards airport



Plange Mill, Düsseldorf



The project:

Reconstruction of the old Plange Mill, conversion into a modern business building

Executing company:
HOCHTIEF Construction AG

The problem:

Installation of a high-water protection system in the cellar rooms

Our solution:

Stationary installation of Tsurumi muddy water pumps, 2 each KRS2-89 and KRS1022 incl. control cabinet of special design

Figure above: 2 pcs. KRS2-89
Figure on right: 2 pcs. KRS1022



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Open-cast gravel mining



The project:

Emptying of sludge lagoon

Executing company:
Fa. Moos Kieswerk + Recycling GmbH
Schwerstedter Str. 59
99955 Lutzensömmern

The problem:

The subzero-grain sludge originating from the gravel washing plant which has collected in the used water pond had to be pumped off.

Our solution:

By the application of a high-performance Tsurumi submersible waste water pump of Type KRS822 with an additionally attached flushing device, which was supplied with fresh water by means of a separate high-pressure pump, the settled sludge was agitated and was pumped off in a highly concentrated condition. The advantage of this type of pump is the low rotational speed of 1450 rpm affording a considerably longer service life.



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Gravel mining Arnold, Flüelen



The project:

The out-dated floating grab dredge plant for gravel digging on the Urner Lake is to be modernised.

Executing company:
Arnold&Co. AG

The problem:

Replacement of the old centrifugal pumps in dry position by submersible pumps

Our solution:

Application of four high-head pumps each of Type LH837 and LH430.
The advantages of the installation of submersible pumps are the much lower noise level and the lower energy consumption, amortising this investment very quickly.



From top:

Fig. 1:

Front view of the two screening plants

Fig. 2:

View of the grab dredge plant with parts of the transport system

Fig. 3:

LH430 prior to installation in shaft



Figure 4, on right:
LH837 prior to installation in shaft



Latest Technology and Highest Quality

A - Tsurumi stuffing box - absolutely watertight

The stuffing box is located at the cable entry section and takes the part of sealing off water. As the cable conductors consist of twisted wires, water may penetrate into the motor by the capillary phenomenon when cable sheath or insulation is damaged or when the end of the cable is submerged. The construction is such that a certain part of the insulation of each conductor is peeled and filled with rubber or epoxy resin for the complete sealing.

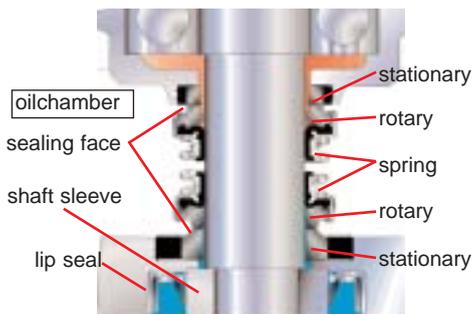
B - Continuous use under dry run ("on snore")

Located directly above the motor windings, a snap-action self-resetting bi-metal device cuts off voltage from all three phase windings simultaneously if the current is too large in one, two or all three windings, or if the windings get too hot.

Tsurumi enables measurement of winding resistance and insulation from the far end of the cable, without ever removing the cover from the motor in the field.

C - Double mechanical seal in oil bath

All Tsurumi pumps dispose of a double sealing systems for extended lifetime:



1. A shaft sleeve in connection with a special lip seal protects the mechanical seal from particles - abrasive particles are expelled back into the flow - they don't have contact with the mechanical seal at all !!

2. All Tsurumi contractors' pumps - even the 400W class - have double mechanical seals inside an oil both. The seal material is Silicon Carbide - no other has greater hardness. Resistance to temperature fluctuation and corrosion is also the best available.

D - Increased wear resistance of pump casing and impeller

As contractors' pumps are used in unpredictable circumstances, Tsurumi has gone a long way towards making the impeller capable of the impossible and towards providing spare motor power to match.

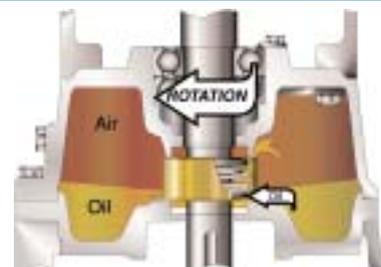
Tsurumi contractors' pumps are used extensively for bentonite mud, often with earth in the case of the models fitted with an agitator.

E - Ball bearings of highest quality

Due to the high quality of the shaft and the bear rings all pumps can be run horizontally when entirely submerged.

Oil Lifter

A special patented guide vane is attached inside the oil chamber. With the motor rotation oil is pumped up. Therefore even at low oil level lubrication and cooling of the mechanical seal is secured.



We reserve the right to change specifications and designs herein for improvement without prior notice. Our pumps are for professional use only. In the event that Tsurumi (Europe) GmbH have, in exceptional cases taken over, a manufacturer's warranty, this entitles the end-user to assert remedy free of charge against Tsurumi (Europe) GmbH due to any defect to the product occurring during the guarantee period (see below), also then when the warranty claims against the seller do not or no longer exist. In the event of malfunction, which is attributable to the improper handling by the enduser, no guarantee claim shall arise. Further claims shall not result from the warranty, unless if something to the contrary has explicitly been determined. The decision as to whether remedy is effected by way of replacement or repair shall be at the choice of Tsurumi (Europe) GmbH. The claims shall be time barred after a period of three months after expiry of the guarantee period, however, not before expiry of the warranty period which is valid towards the seller. In the event of doubt, the warranty period shall correspond with the warranty period which is valid between the end-user and his seller.

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