

Sewer Safety Equipment *for the* TMAs of Punjab

Use of Equipment & Specifications



Detail of 27-TMAs with Sewer Safety Equipment Sets

Sr. No	Name of TMA	No. of Sets
1	Sangla Hil	2
2	Qila Dedar Singh	2
3	Taunsa	2
4	Rajanpur	2
5	Rojhan	2
6	Haroonabad	2
7	Minchinabad	2
8	Iqbal Town, Lahore	2
9	Jampur	2
10	Chistian	2
11	Kot Momin	1
12	Piplan	1
13	Chichawatni	1
14	Arifwala	1
15	Narowal	1
16	Shahpur	1
17	Khushab	2
18	Esakhel	1
19	Chak Jhumra	1
20	Tandianwala	1
21	Samundri	1
22	T.T.Singh	2
23	Mian Channu	1
24	Jatoi	2
25	Bhakar	2
26	Pindi Gheb	1
27	Depalpur	2
Total		42

Sewer Safety Equipment for De-Silting of the Sewer Manholes

Modern living cannot be imagined without a sewerage system. Sewers get silted up because of entry of silt and other materials and are required to be continuously cleaned by taking out the silt from the manholes. Sewer men enter the manholes for de-silting where combustible, injurious and fatal gases mentioned below are present. Numbers of deaths have been reported in various TMAs of Punjab because of inhalation of these gases by the workers. This happened because of nonuse of the required safety equipment during work in the manholes.

Chief Minister Punjab took these accidents very seriously and ordered to provide safety equipment for use by the workers during the de-silting process.

A brief description and use of the set of this equipment being provided to TMAs is given below;

1: Multiple gas detectors

The injurious and fatal gases present in the manholes are hydrogen sulfide, methane, ammonia, carbon monoxide, sulfur dioxide, and nitrogen oxides. This device detects main injurious gases like hydrogen sulfide, methane, and carbon monoxide along with the percentage of oxygen present in manhole. The device is lowered in the manhole above water level and after a beep it is taken out and readings of oxygen level and other three gases is recorded. The normal and dangerous level of these gases is given below.

Gas property	Gas name	Normal level	Dangerous level
Life gas	Oxygen	20.9 %	Less than 19%
Combustibles	Methane & hydrogen	0.00 %	20 %
Toxic & Poisonous	Carbon mono oxide	0.00 %	400 ppm
	Hydrogen sulphide	0.00 %	150 ppm

If the quantity of fatal gases is more than the tolerable limit and the oxygen percentage is less than the safe limit, the workers are not allowed to enter the manhole unless all injurious gases have been pushed out of the manhole and safe level of oxygen is maintained.

2: Air blower and exhaust

The unit consists of a blower along with a special fabric armored (7 meter long) duct with a plastic casing to house the duct. The duct is lowered in the manhole with its lower end above the water level and blower is operated which pushes the fresh air in the manhole and pushes the fatal gases out of the manhole. The gas detector is lowered again in the manhole to re-determine the quantity of fatal gases. If the manhole is found free of these gases, the workers are allowed to enter the manhole. The blower can also be used as exhaust for these gases.

3: Tripod and hand winch

The unit comprises of a non corrodible non rustable tripod with adjustable height (maxim height 10 feet) and a hand winch which can be fitted on one leg of the tripod. The winch has a non rustable non corrodible steel rope along with a pulley and hook to hang the worker through a safety harness. The tripod legs have non slip plates at the bottom along with locking chains. The worker can be lowered easily and safely into the manhole with the hand operated winch and can also be taken out of the manhole speedily and safely just with turning of the winch handle with nominal force. The equipment is utterly useful in ascent of the sewer man out of the manhole in emergency.

4: Compressed airline system

The equipment comprises of a small two wheeled trolley fitted with two 6.0 litter capacity cylinders, pressure gauges, feeding hose of 10 meters length wound on a reel along with a fresh air compressor to compress the air at 300 psi. The unit also contains a full face mask with breathing hose, safety belt and air regulator. The cylinders are filled with compressed air at 300 psi and the trolley is shifted to site of work. The worker while working in the manhole takes the fresh air from the feeding hose through the regulator and the breathing hose. The quantity of the air required can be adjusted with the regulator as per requirement. The cylinders use time is 2 to 2.5 hours depending upon the effective control from the regulator. When the pressure in the cylinders drops below 30 psi an alarm is heard at the ground as well as with worker in the manhole and then he is taken out of the manhole.

5: Fresh air respirator

The equipment comprises of a fresh air feeding hose, a filter unit fitted on one end of the hose and a steel peg to anchor the hose on the ground. The other side of the hose is coupled to the breathing hose of the full face mask worn by the worker while working in the manhole. The worker inhales fresh air through the feeding hose as long as he stays in the manhole. The normal length of the feeding hose is 10 meters which does not suffocate to the worker. The length can be extended through a coupler but the extended length will require a small air turbine otherwise the worker will feel suffocation. The usual depth of sewers in Punjab does not require the extended length of the air hose.

6: Safety helmet

The worker during descent or ascent in the manhole or during work may strike his head with manhole wall or manhole frame. For this purpose the safety helmet is provided to the worker which, when worn, saves the worker from all type of head injuries.

7: S.M.D head lamp

The worker will require light in the manhole for working. This light can be fitted on the safety helmet of the worker and provides light on the front of the worker. The light is operated by a battery comprising of two rechargeable cells and dry cell of the same type can also work. The light can be increased decreased or switched off through a button

provided on the bottom of the light. A flicker mode of the light can also be achieved with the same button which indicates the signal for the workers on ground to take the worker out of the manhole.

8: S.M.D. Flood light

It is a 50 watts 220 volts flood emergency light with reflector which can be operated by a generator at site. The equipment provides sufficient light for reflecting in the manhole and on the surrounding ground for night work.

9: Generator

A 4-KVA generator with AC 220 volt current has been provided to operate the electric equipment such as lights, blower and compressor at site during the day and night. It is portable and can be transported easily on the vehicle.

10: Dry suit

It is a water proof suit worn by the workers when working in water or under water. The waste water contains large amount of chemicals and compounds which produce skin diseases by coming in contact with worker's body. This suit prevents contact of the waste water with worker's body. The suit is equipped with water tight face and head cover, water tight gloves and shoes. To protect the workers from skin diseases the suit should be worn before going in waste water.

11: Safety shoes.

These are hard material shoes which, when worn, do not allow any pointed or sharp things to penetrate. Hence the feet are safe from any hard and sharp materials and other injurious materials in the manhole bed.

12: Hand Gloves

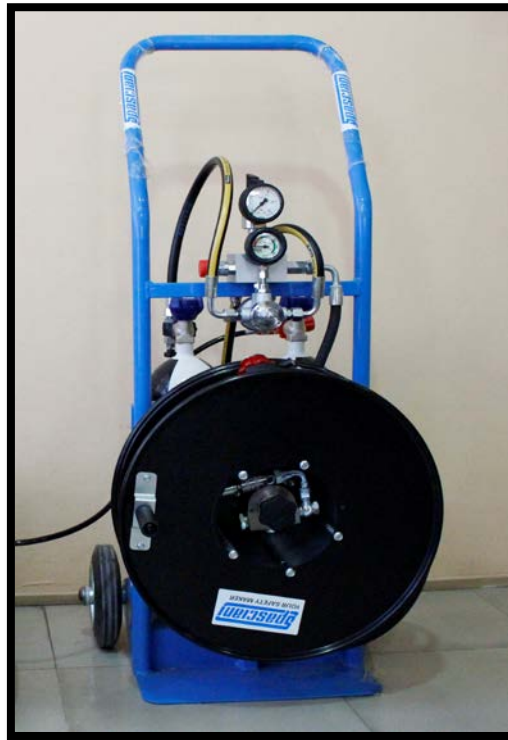
These are rubber long gloves worn on both hands by the workers during working period. These gloves save any injury to the hands during working.

13: Dry cell torch

This light torch is required for use in emergency when the light during the night fails. The torch is equipped with ordinary dry battery cells which can be easily replaced when used up.

LIST OF SEWER SAFETY EQUIPMENT

Sr.#	ITEM DESCRIPTION	Country of Origin	Make/ Brande	Model
1	a. Compressed air line system	ITALY	SPASCIANI	RC-2603
	b. Compressor	ITALY	SPASCIANI	P 100
2	Fresh Air Respirator (Non-Assisted)	ITALY	SPASCIANI	DUCT ECO
3	Multi Body Rescue Harness (Safety Harness)	POLAND	PROTEKT	P-05
4	Portable Multiple Gas Detector	USA	RKI	GX-2009
5	a. Tripod (Corrosion-resistant finish)	POLAND	PROTEKT	TM 11-T2
	b. Hand Winch (Corrosion-resistant finish) with Lifting Sling	POLAND	PROTEKT	UP 502-AT
6	SMD Head Lamp	CHINA	BAILONG	BL-T07A
7	Air Blower & Exhaust (with Air Duct)	POLAND	PROTEKT	WP 212
8	SMD Flood Light with Stand (Emergency light)	CHINA	RECO	-
9	Portable Generator 4-KVAC	CHINA	FUZOU EMEAN	EM5500A
10	Dry Suit	UK	THOR	SPECIALIST SUIT
11	Safety Shoes	CHINA	MAK	-
12	Safety Helmet	CHINA	MSA	-
13	Hand Gloves	PAKISTAN	PAK TIGER	H-18
14	Torch with Dry Cells	CHINA	SWAT	RC-808

1: COMPRESSED AIR LINE SYSTEM WITH COMPRESSOR*(SPASCIANI-ITALY RC 2603)*

Sr. #	Specifications
1	Full face polyurethane mask meeting the requirements of EN 136:1998 with panoramic visor granting wide visibility and fitted with five arm head harness to properly fix the mask to the face and carrying strap to hang the mask around the neck during rest.
2	Flexible breathing corrugated hose having standard threads to connect with the mask on one side and with PVC manifold (interposing to the air regulator and the feeding hose) on the other side.
3	Air regulator to be fixed on the waist belt and easy operate able by hand while working in narrow places.
4	Feeding hose not less than 15m without joint as standards length and wound on a reel fitted on 2-wheeled trolley including pressure demand valve
5	Two compressed air cylinders (6 liters each with minimum 300 bars pressure mounted on 2-wheeled trolley)
6	Waist Belt
7	Pressure Reducer
8	Audible warning device at reduced pressure both at trolley and on the worker side.
9	One extra length (minimum 15m) of the feeding hose

2: FRESH AIR RESPIRATOR-NON ASSISTED*(SPASCIANI-ITALY DUCT ECO)*

Sr. #	Specifications
1	Full face polyurethane mask meeting the requirements of EN 136:1998 with panoramic visor granting wide visibility and fitted with five arm head harness to properly fix the mask to the face and carrying strap to hang the mask around the neck during rest.
2	Flexible breathing corrugated hose having standard threads to connect with the mask on one side and with PVC manifold (interposing to the feeding hose) on the other side.
3	Two numbers fresh air PVC feeding hose in 10 meter length and adequate internal diameter to provide comfortable breathing for one person at its end without the aid of air fan. The hose will have standard metallic threaded connectors to connect the hose with filter on one side and with manifold on the other side.
4	End filter of plastic body with a net to prevent the accidental penetration of external corpuscles, dust, pebbles and other air borne materials.
5	Metallic fixing peg to fix the feeding hose to the ground.
6	Plastic carrying case to house the mask, breathing hose and all above mentioned accessories along with 10 meter length of feeding hose.
7	Metallic connector with standard threads to connect both lengths of feeding hoses for making total hose length of 20 meters.
8	Adjustable harness fitted with a special ring allowing to keep the corrugated hose in position over the shoulder and along the back enabling the operator to move in narrow space.

3: MULTI BODY RESCUE (SAFETY) HARNESS*(PROTEKT (POLAND) P-05)*

Sr. #	Specifications
1	The rescue harness will conform to CE EN361 and CE EN-358 specifications and will have under mentioned fittings and accessories
2	Dorsal anchorage point
3	1 dorsal attachment D-Ring
4	1 sternal attachment D-Ring
5	Ventral suspension D-Ring
6	2 work positioning D-Ring
7	Padded thigh and shoulder straps
8	Padded ergonomic back panel
9	Adjustment: thigh and shoulder straps
10	Accessory rings
11	Maximum Load weight: 250 kg

4: PORTABLE MULTIPLE GAS DETECTOR

(RKI (USA) GX-2009)



Sr. #	Specifications
1	Must detect at least (CH ₄ , CO, O ₂ , H ₂ S)
2	TFT screen display for gas concentration
3	Response time less than 60 second
4	Working temperature (-22 to 50 C0).
5	Power supply: Lithium battery
6	Water proof
7	Alarm with LED buzzer & vibration
8	Durable, sturdy hook to lower the device in sewer manhole.

5).TRIPOD WITH HAND WINCH

(PROTEKT (POLAND) TM 11-T2)



Sr. #	Specifications
1	Must confirm to EN-795 Standards
2	Minimum 02 anchorage point
3	Height: 310 cm and above.
4	Non slip bed plates
5	Load capacity (minimum): 500kg
6	03 load locking pins in each pole of the Tripod
7	Material: Heavy duty aluminum alloy tripod
8	Chain/webbing set to secure the bottom legs of the tripod
9	Hand Winch
10	Must confirm to EN-1496 class-B Standards
11	Heavy duty aluminum alloy body with handle
12	Load lifting capacity (minimum): 250kg
13	Attach to tripod with locking safety pins
14	installable on any leg of tripod
15	Oil impregnated bearings
16	Manual safety lock
17	Required number of aluminum alloy holders/anchors for installation of the winch on tripod leg
18	Corrosion-resistant finish

6: SMD HEAD LAMP
(*BAILONG (CHINA) BL-T07A*)



Sr. #	Specifications
1	Easy to install at safety helmet including non-slip head harness or belt for this installation.
2	Adjustable angle lamp bracket.
3	Rechargeable lamp battery
4	Water proof

7: AIR BLOWER & EXHAUST WITH AIR DUCT

(PROTEKT (POLAND) WP 212)



Sr. #	Specifications
1	Confirming to NFPA IEN Standards
2	Electrically operated single phase
3	Power: heavy duty up to 01 hp motor, standard 220-230 volts 50 cycles
4	Equipped with non-slip base plate.
5	Minimum air displacement in the assembly = 1100 m ³ /hour
6	Capable to be converted into air blower and air sucker as per need.
7	All component to be quoted for greater wear resistance
8	High quality collapsible fabric duct 20-25 cm diameter armored with non-rustable helical steel wire with minimum 7.0 meters length to be housed in a rigid plastic lockable carrier directly coupled with the blower body and having same diameter

8). SMD FLOOD LIGHT WITH STAND

(EMERGENCY LIGHT)



Sr. #	Specifications
1	Type: SMD LED Floodlight
2	Light source: SMD LED /COB LED (Bridgelux,Epistar Cree/Osram/Phlips LEDs or equivalent) warm light
3	Capacity: 50 watts
4	Material:; AL + Tempered Glass
5	Input voltage: 190-265 VAC 50 hertz
6	Equipped with highly stable non rustable non corrodible ground stand having 120 swivels.
7	Weather protection --- Out door IP-67

9: PORTABLE GENERATOR

(EMEAN (CHINA) EM5500A)



Sr. #	Specifications
1	Alternator = Single phase 220-230 volts 50 Hertz
2	Capacity = 4 - KVAC
3	Engine = Imported 4-stroke air cooled hand start petrol engine directly coupled with alternator.
4	Power take off = Two Nos three pin and one No two pin outlet ports.
5	Instrumentation = Ammeter, voltmeter, power indication light, overload relay or circuit breaker

10: DRY SUIT*(THOR (UK)-SPECIALIST SUIT)*

Sr. #	Specifications
1	Dry suit for underwater working in muddy, sewer
2	Dry suit made up of cut. Abrasion water proof and Chemical resistant material (say neoprene). Front or rear entry zipper with protective flaps. Inflator and relief valves in the suit. Extra padding on elbows and knees.
3	Tri-laminated one piece suit with latex seals on wrists and collar. Compressed rubber boots.
4	Storage temperature 0 C0 to 60 C0
5	CE Certification for rescue/emergency service conforming to BSEN ISO 14225 - 2 : 2005
6	Water proof detachable neoprene hood. A repair of separate abrasion resistant gloves. Inflator hose and repair kit.
7	Orange / yellow fluorescent color

11: SAFETY SHOES*(MAK (CHINA))*

Sr. #	Specifications
1	Sole: Black direct injection sole made of Rubber PVC Combination which should be acid. Heat & oil resistant. Anti-slippery and anti-static.
2	Upper Material: Black buff plain original leather (1.8mm to 2.0mm thick). Durable and comfortable.
3	Lining: No lining except leather lining in vamp area
4	Steel Toe Cap: Imported, impact resistance capacity up to 200 Joules.
5	Insole: Anti-Static Taxon 1.75mm (imported)
6	Tongue: Soft leather tongue stitched with quarter (behind eyelet facing for laces from inside)
7	Collar: Inner synthetic collar with f foam padding_(Foam Sheet High Density)
8	Back Counter: GAMA Counter Sheet (Min. 1.2mm thick)
9	Eyelets: Aluminum Black
10	Laces: Plain Black Nylon Flat 36-Inches
11	Shank: Steel, thickness 0.9mm
12	Shoe Height: Minimum 12cm from inside without in sock

12: SAFETY HELMET (MSA (CHINA))

Sr. #	Specifications
1	Outer shell made of high strength and impact proof material.
2	Inner lining to be breathable with individual heard adjustment and chinstrap.
3	High comfort durable and washable integral skin of P.U filled inner lining I padding of minimum 10 mm, on the top with grooves for ventilation

**13: HAND GLOVES (PAK TIGER (PAKISTAN) H-18)**

Sr. #	Specifications
1	The gloves are required for protection of hand of the workers.
2	The gloves may be made of any inert, robust and lightweight material/fabric.
3	The gloves will be easily maneuverable with the movement of hands.

**14: TORCH WITH DRY CELL (SWAT (CHINA) RL-808)**

Sr. #	Specifications
1	The torch is required to peep into the manhole during night from ground level.
2	It will be equipped with three dry battery replaceable cells of "D" size.
3	The body of the torch will be made of non rustable non corrodible material.
4	The rear of the torch will have a hook for hanging it with some peg or human waist belt.
5	The reflector will be made of good material and the reflective lining in it will not be subjected to any type of rusting or corrosion with passage of time

