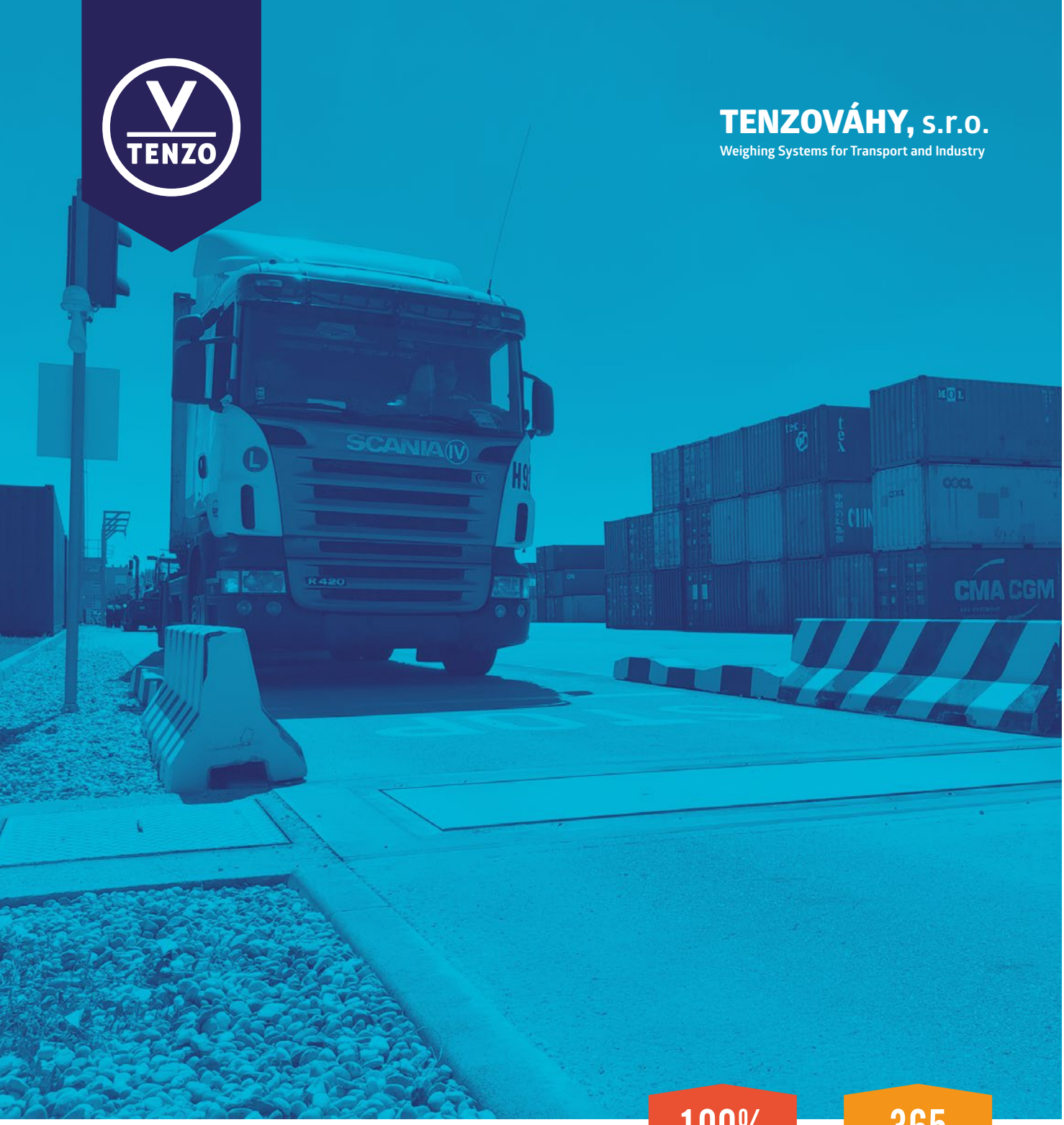


TENZOVÁHY, s.r.o.
Weighing Systems for Transport and Industry

100%
Automatic weighing system

365
On-call service

TENZOWIM 134
Axle Weighing System for Weighing Vehicles in Motion

www.tenzovahy.com

TENZOWIM 134 Axle Weighing System for Weighing Vehicles in Motion (WIM)

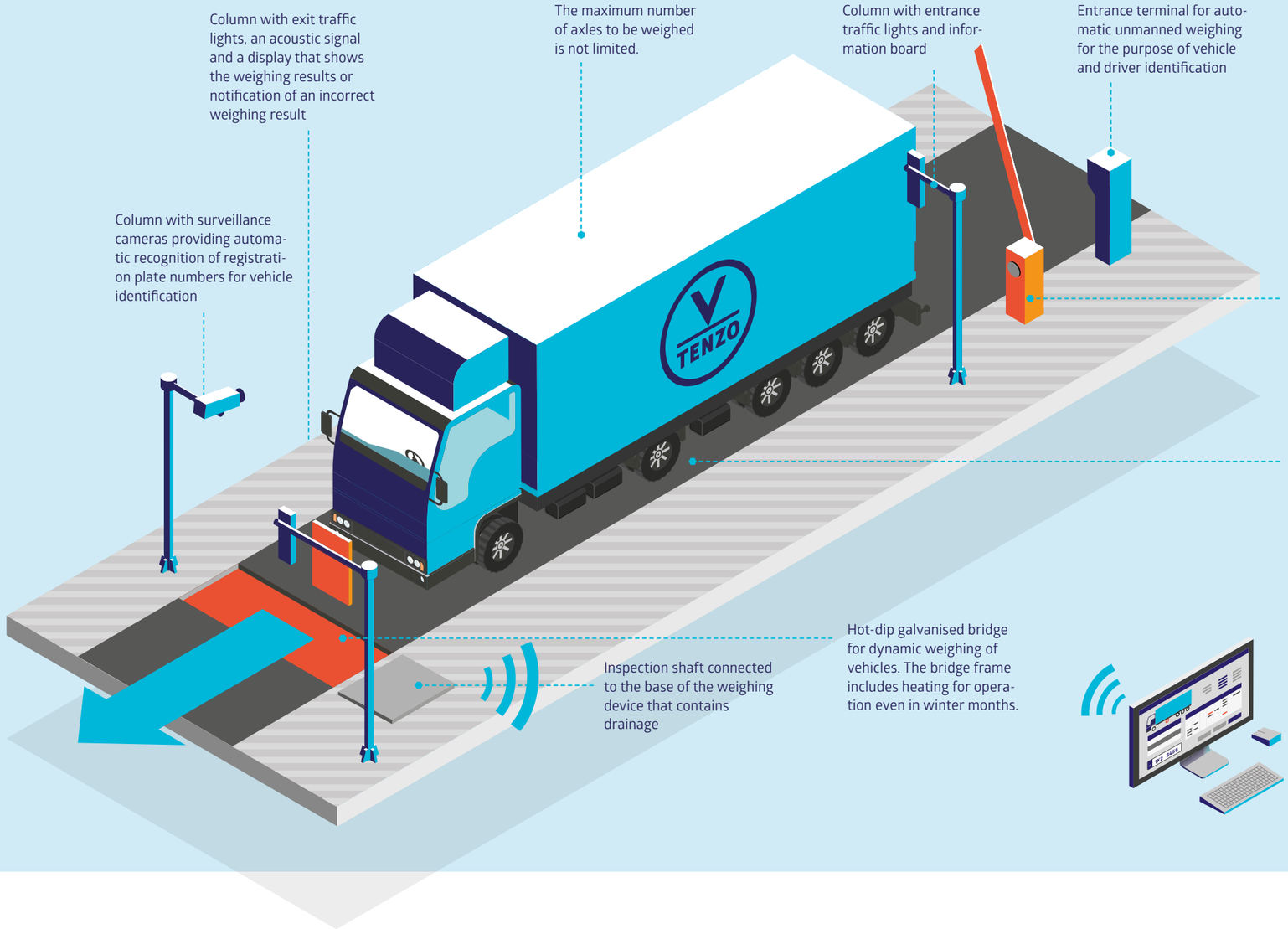
The TENZOWIM 134 Axle Weighing System is used for automatic weighing of road vehicles in motion without the need to stop. This is a dynamic weighing system. It is distinguished by low operating costs and high accuracy.

Its use is in weighing for law enforcement by state authorities and in many sectors of industry.

The axle weighing system is certified according to OIML R 134 for both weighing for law enforcement and commercial weighing.*)

The weighing system is stationary, i.e., installed in a fixed position in the weighing zone.

Note: *) The type approval number of the TENZOWIM 134 Weighing System is TCM 128/19 – 5651.



How does the axle weighing system work?

As the vehicle is passing over the weighbridge, it is weighed by the **TENZOWIM 134** system, which evaluates **the load on individual axles and axle groups and the total weight.** By using **additional accessories such as cameras, traffic lights, barriers,** etc., the weighing system can be operated in **unmanned mode.**

Easy and cost-effective maintenance

The weighing system is installed in a steel frame embedded into the driveway. The axle weighbridge can be easily picked up by forklift at any time and put back after cleaning the base or other maintenance.

Why use the TENZOWIM 134 Axle Weighing System?

The weighing system is fully automatic. Scales can be operated in unmanned mode. This significantly speeds up clearance of vehicles.

High precision weighing of total vehicle weight and individual axles.

The weighing **system provides the user with real-time information about the vehicle's instantaneous weight.** The comfortable software included allows printing.

The weighing system is ready for use in harsh climatic conditions. Heating ensures reliable operation of the weighing system even in winter months.

Advanced **diagnostics** for preventive maintenance and **guaranteed maximum uptime. Availability of 24/7 on-call service.**

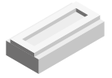
The weighing system is regularly verified every 12 months

Technical specifications

Weighbridge dimensions	from 2,900 x 700 mm to 4,000 x 900 mm
Surface treatment of the bridge	zinc galvanised
Load sensors	4 x 20.000 kg, OIML R 60, class C3, stainless steel, protection IP 69 K
Operating temperature/humidity	-40 °C to +70 °C/ 70%, non-condensing
Verified weighing capacity per axle	200 to 20,000 kg
Maximum number of axles being weighed	unlimited (up to 99)
Scale resolution	from 50 kg
Accuracy class in static mode	III
Accuracy class in dynamic mode according to OIML R 134	1% for total weight, 2% for axle weight, i.e., 1 B (at speeds up to 6 km/h)
Weighing in motion	yes, up to 50 km/h
Frost protection	heating of the weighing system frame with temperature control
Metrological approval according to OIML R 134	TCM 128/19 - 5651
Weighbridge base of precast concrete *)	Dimensions/weight 3,500 x 1,455 x 500 mm / 6 t for standard weighbridge size of 2,900 x 700 mm

Note: *) Optional item – installation of the weighing system either using precast concrete, which comes with an in-built frame and optional heating cable, or using building blocks directly on site. The prefabricated material only is supplied for the standard weighbridge size.

Optional Accessories



Precast concrete base to speed up installation

Weighing system frame heating for comfortable year-round operation

Set of traffic lights for entry and exit

Camera system for reading vehicle registration plates

Camera system for monitoring vehicles

Camera system to detect vehicles that avoid weighing

Automatic entrance barrier

Set for automatic operation of the weighing system in commercial weighing

High visibility outdoor display

Large signboard displaying the total weight, axle weight and optionally the vehicle registration number

Variable Message Sign to guide the vehicle into the weighing zone

Workstation with display and printer

Software for weighing for law enforcement in traffic

Software for shipment weighing in industry

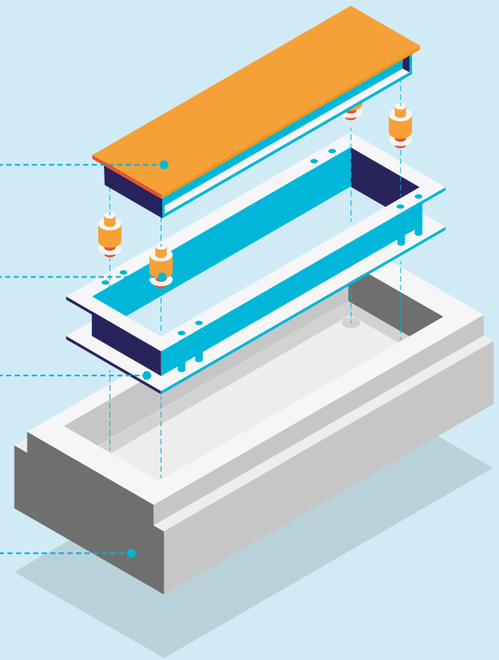
Mechanical Design of the TENZOWIM 134 System

The weighbridge is equipped with damping elements for weighing at higher speeds. The axle weighbridge can be easily picked up by forklift at any time and put back after cleaning the base or other maintenance

4 pieces of stainless steel strain gauges – OIML R 60/20 t

The steel frame of the weighbridge can be equipped with heating for reliable operation even in severe weather conditions

The base of the weighing bridge is a concrete structure in the upper part equipped with a steel frame, which is connected to the weighing zone.



Weighing control system, connection additional accessories

The TENZOWIM 134 Axle Weighing System is equipped with the latest generation of the WIMCONTROL system, which allows communication with basic accessories.

This translates into better diagnostics of the weighing system's sensor elements, which can be done through remote access, either by a service company or directly by the manufacturer. It is thus possible to carry out forward, or predictive diagnostics, which can also reveal hidden defects in important elements of the weighing system.

This means there is no danger that in the event of a sudden failure, the user of the weighing system will have to wait for days for it to be repaired.

WAPI interface

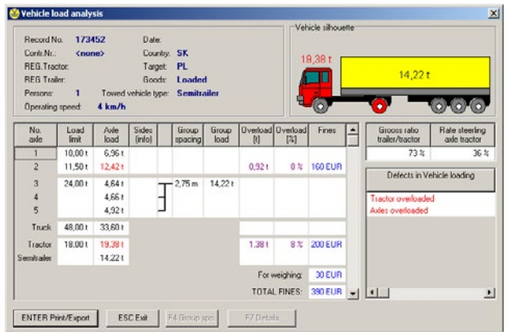
The system partner can either use a ready-made software application for weighing provided by the manufacturer or prepare its own using the so-called WAPI interface (Weighing API), which is an application program interface for communication with the TENZOWIM 134 weighing system.

The Weighing Application Programming Interface – hereafter referred to as "WAPI" – is a unified high level interface allowing common and standardised connection of client applications to the WSERVER (weighing server) developed by TENZOVÁHY in accordance with the European standard EN 45501:2015, the International Recommendation OIML R 134 and the WELMEC Software Manual 7.2:2015.

Indicator and Software for the TENZOWIM 134 Weighing System

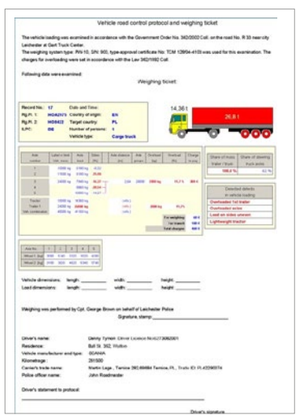
The weighing control system with weighing software is an intelligent weighing indicator that provides the user with a "Weighing Proof" immediately after the vehicle has driven over the weighbridge, in accordance with applicable national legislation. The document can be immediately printed or exported for further use.

Software for weighing in law enforcement



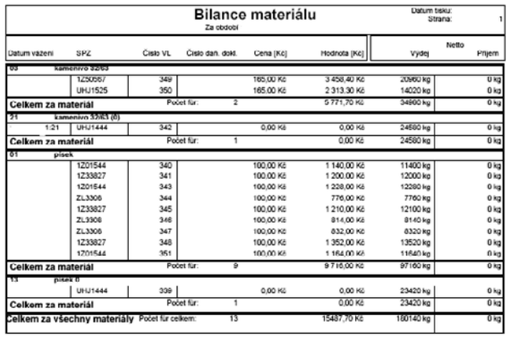
Software for law enforcement from which it is possible directly print so-called weighing protocols

- the software meets the needs of national road operators and state technical supervision bodies
- provides automatic analysis of the vehicle load (axles, axle groups and total weight, including a view of the vehicle's silhouette, i.e., axle layout) according to national load limits
- compares the actual load on the vehicle with national limits and automatically sets penalties for overloading
- includes extensive data management, export and reporting



The weighing report from the PW-10 system is used as a basis for imposing a penalty on the driver of an overloaded vehicle

Industrial weighing software



Industrial weighing software

- the software controls the scales even in fully automatic mode
- weighs vehicles to determine the weight of imported and removed cargo
- automatically matches the Gross and Tare of vehicles according to their registration plate and calculates the Net load
- keeps accurate records of traffic over the scale - books of materials, vehicles, carriers, customers
- prints weighing slips, as well as tax documents for cash or invoices
- calculates materials shipped to individual events and monitors the limits of materials that are allocated to events
- generates balances of weighed materials, overview of customers, carriers, events and issued tax documents from weighing records
- exports weighing data to files or can export it to the company's information system
- controls scale accessories such as overview video cameras vehicles or keyboard terminals with chip readers cards for unattended operation

Declaration of Weighing Accuracy

The company TENZOVÁHY, s. r. o. declares that the Weighing System TENZOWIM 134, which has been certified by the Czech Metrology Institute according to International Recommendation OIML R 134 (2006) and obtained type approval No. TCM 128 / 19-5651, is capable of operation in the following accuracy classes:

Operating speed	Total vehicle weight	Axles and axle groups
1–6 km/h	1	B
6–10 km/h	2	C
10–20 km/h	2	D
20–30 km/h	2; 5	D; E
30–50 km/h	10	F

The final accuracy class assignment is based on the result of verification of the weighing system carried out at the specific weighing location. The operating speed may be limited according to the specific conditions at the weighing site.

This distribution applies under optimal conditions, which include:

- the weighing point must be set up in accordance with the manufacturer's technical documentation, in particular the design of the weighing zone
- the reference vehicles used for calibration and verification of the weighing system are equipped with air suspension on all axles and are in perfect working order
- the reference vehicles traverse the axle weighbridge smoothly; any braking, acceleration or gear shifting is prohibited. An incorrect style of driving is identified by the weighing system and the weighing is then stopped with no evaluation taking place

Type Approval Certificate

The TENZOWIM 134 Weighing System has been certified in accordance with International Recommendation OIML R 134 by the Czech Metrology Institute under number TCM 128/19 – 5651.

Erection and Assembly

The setting up of the weighing station typically is provided based on the respective project documentation.

The weighing station consists of the following parts:

- weighbridge base
- inspection shaft
- weighing zone
- weighing system accessories
- weighing room – operator's workplace with wiring

The weighbridge base is a concrete structure fitted in the upper part with a steel frame connected to the weighing zone. The weighbridge with weight sensors is mounted into the base frame during the technology installation.

The weighbridge base can be in the following two forms:

- **the monolithic concrete base** is suitable for the installation of weighing stations in locations with unpaved road surfaces around the weighing zone – typically for example quarries, sand pits, waste dumps, etc. The base depth – typically 900 mm or more – below the level of the weighing zone allows for a steeper sloping of the base bottom towards drainage, thus reducing soiling inside the base.
- **the precast concrete base with preinstalled base frame and heating cable** speeds up and simplifies the site preparation. The slope of the bottom towards drainage is limited by the height of the prefabricated part of 600 mm, and thus is suitable for locations where the weighing zone is surrounded by paved road surfaces and there is a lower risk of soiling of the weighbridge base.

The inspection shaft is made along the shorter side of the weighbridge base and is oriented towards the weighing room. The inspection shaft features the weight sensor cabling, the power cable and an earthing point. The inspection shaft bottom is connected to the drainage system for rainwater from the weighbridge. Cable ducts for power and data cabling are led from the inspection shaft to the weighing room and the weighing system accessories.

The weighing zone is a concrete road surface designed with a specific emphasis on flatness and a smooth transition of the zone to the weighbridge base. Any unevenness of the weighing zone affects the vehicle weighing accuracy. The only acceptable road design is of road concrete because vehicles traveling over the weighbridge all move in the same track, which would make other types of surfaces (bitumen, panels, tiles) rapidly uneven through wear and thus affect the weighing reliability and accuracy.

The weighing zone needs to be built at least 150 mm high above the surrounding terrain (= the height of a road curb), to prevent the accumulation of rainwater and dirt on the weighing zone's horizontal plane.

The weighing zone is a concrete road surface designed with a specific emphasis on flatness and a smooth transition of the zone to the weighbridge base.

The weighing system accessories require preparation for power and data cabling, and anchors for the installation of various equipment such as:

- safety devices (e.g. barriers or reflective posts delimiting the driving lane of the weighing zone)
- signalling devices (traffic lights, barriers etc., to control the vehicles travelling through the weighing system
- additional equipment (outdoor displays, camera systems, self-service terminals and other accessories according to the customer's requirements for the weighing system functionality.

The weighing room also serves as the weighing crew workplace. It features the weighing system electronics and computer equipment. In automatic operation, the weighing room can be replaced with an outdoor kiosk for the installation of the weighing system electronics. Automatic weighing systems are equipped with an optional automatic vehicle identification system.

Monolithic base of scales using „lost formwork. The base frame of the scales is leveled on the base tray, to the left of the frame (towards the weighing room) the base for the inspection shaft can be seen.

Axle weigh bridge before settling in the frame

Schedule for the construction, installation and commissioning of the TENZOWIM 134 Weighing System

day	1	2	3	4	5	6	7	8	9	10	11	12	13–27	28
Excavation for the base of the weighing zone	■	■												
Digging a pit for the weighing system / dismantling the original weighing system *)		■												
Creating the base under the bridge frame			■											
Installation of the weighbridge frame						■								
Assembly of sensors and other electronics						■								
Concreting the weighing zone							■	■						
Commissioning												■		
Calibration														■
Official verification														■

Note: *) If overhauling the original weighing system

Proper construction of the weighing zone - road with cement concrete cover above the level of the surrounding terrain

Maintenance of the TENZOWIM 134 Weighing System

The maintenance procedures are described in the weighing system operation logbook that comes with the weighing system. Daily maintenance is not demanding, though neglecting these duties can lead to shortened service life or even cause the weighing system outage.

Maintenance overview and schedule

	daily	monthly	semi-annually	annually
Cleaning the axle weighbridge, weighing zone and the joint between the bridge and the frame	U			
Checking the entry of zero levels in the operation logbook	U			
Cleaning the inspection shaft and waste drainage to the sewage system		U		
Checking and cleaning the drainage channel		U		
Checking the cabling		U		
Checking and cleaning the weighing system base		U	S	S
Checking the cabling and electronics			S	S
Checking the flatness of the approach sections – weighing zone				S
Calibration (static and dynamic with 3 types of vehicles), typically followed by official verification by a metrology institute				S (M)

U – to be performed by the user,
S – to be carried out by the service organisation staff,
M – to be done by the metrology institute with the aid of the service organisation staff

Calibration and Official Verification

Recalibrations of the TENZOWIM 134 Weighing System are performed using certified calibration equipment or weight blocks.

This 'static' calibration is followed by a dynamic calibration. Three types of vehicles with known weights provided by the user of the weighing equipment are used:

- a two-axle vehicle
- a three-axle vehicle with tandem axles
- a five-axle cargo vehicle with triple axles

The vehicles must be loaded to the required total weight and weighed in advance on the nearest verified weighing system. The vehicles must be in good technical condition (in particular their suspension and tyres).
Each of the reference vehicles performs 10 test runs over the test bridge.

The weighing system is then assigned an accuracy class according to OIML R. 134 (Recommendation of the International Organization for Legal Metrology).

Quarries, sand pits, material dumps

Agriculture, biogas plants

Energy, bio-waste incinerators

Industrial production, concrete plants

Logistics centers

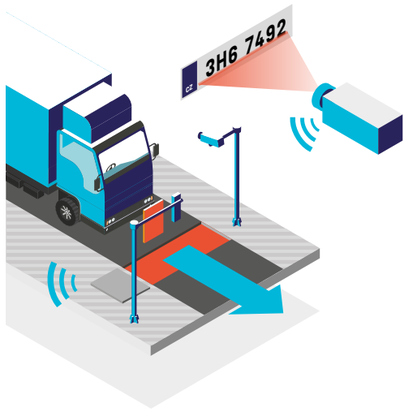
Electronic toll collection

Container transfer points

Weighing for law enforcement

[Map of the use of weighing systems from the company TENZOVÁHY]

Weighing systems operate without an operator



Unattended vehicle weighing significantly reduces operating costs!
Control of scales with a PC and related software greatly simplifies weighing process. By using other accessories, such as cameras, traffic lights, barriers and other elements is possible operate the scales in unattended mode, which opens up space for clear registration of vehicles, materials and carriers also for generation of invoices, balance sheets and export of data to related information enterprise systems.

In case of weighing for law enforcement, the data is sent directly to the national register of offenses, or municipality with extended scope according to the legislation of the country.

Introduction of the company TENZOVÁHY, s. r. o.

Weighing systems from TENZOVÁHY have been operating reliably for more than 25 years both in the Czech Republic and in other countries in Europe, Asia and Africa. In the Czech Republic, we supply turnkey weighing technologies. Abroad, we support technically local companies that implement the construction and installation of weighing technologies, including the provision of regular maintenance. The common goal of such cooperation is to ensure the permanent operability of the systems we supply and thus the satisfaction of the users of these devices.

TENZOVÁHY products have been meeting for a long time national and international standards valid in the EU, including strict international recommendation OIML R. 134 et seq standards.

Therefore, our clients have the certainty that the scales we supply and installed will help them not only with the correct registration of loaded raw materials, but that they will also reliably protect them from possible sanctions for overloaded vehicles.

Our stable business partners in the country include both private companies and state supervision institutions dealing with weighing for law enforcement in transport - Police of the Czech Republic, Customs Administration of the Ministry of Finance, Road Maintenance Administration, a number of regional authorities of the Czech Republic and other state institutions such as the Administration of state material reserves. We implement similar cooperation through the network business partners abroad.

Services for System Partners

- **selection of the fitting** product including extensive documentation and sample project documentation for planning, installation and operation of weighing systems
- production and supply of standard weighing systems
- **product customization** as may be needed according to client or project requirements
- **software** for installation and diagnostics
- **online or on-site training, including support with first-time** installation of weighing systems
- **Warranty and post-warranty service** including technical support with official verification
- **helpdesk**
- **remote diagnostics** of supplied equipment
- **on-call service, including on a 24/7 basis**

In which countries do our systems work?

Contact address

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Don't wait, start weighing!