

PANEL

BRIDG

—PANEL BRIDGES—



Puente Rio Tranquilo,
Pantagonia, Chile, 2013

—A STANDARD SOLUTION THAT SETS STANDARDS—

Some types of Envi Staving bridges are impressive due to their sheer looks. They include sophisticated architectural bridges no less than monumental suspension bridges. Other types of bridges are fascinating on account of their functionality. This category applies to Envi Staving panel bridges. The usefulness of this type of bridge makes an impressive argument. If very short set-up times, easy installation and a high level of flexibility are the order of the day, then the panel bridge is the right answer for you.

Envi Staving is one of the world's top suppliers of panel bridges. We sell more than 100 bridges a year around the world – thus we make an important contribution to the development of urgently needed infrastructure.

ADVANTAGES

The Envi Staving panel bridge system ensures a number of advantages:

- EXTREMELY SHORT DELIVERY AND CONSTRUCTION TIMES
- NO NEED FOR EXTENDED TRAINING of the executing staff
- LIGHTWEIGHT SINGLE COMPONENTS
- EASY ADAPTATION to different spans (up to 80 m single span), different deck widths and traffic loads

The Envi Staving panel bridge is a bridge system comprising modular elements that are interchangeable. Owing to this span structure, panel bridges can be easily adapted to different span lengths (up to 80 m single span), deck widths (one or two lanes) and the desired load capacity. The strongest panel bridge from Envi Staving, for instance, withstood a load of 512 tons with ease.

The system is particularly suited for temporary usage, e.g. as an emergency or disaster relief bridge, a provisional bridge for construction sites or a line of communication bridge for military purposes. Due to the simple structure, the bridge can be built very quickly, even with unskilled workers.—

- HIGH LOAD CAPACITY through the use of high-strength steels
- ONLY ONE TYPE OF PANEL (no mix-ups possible)
- NO COMPLICATED THREADING OF THE TRANSOM between the panels
- FAST DELIVERY through warehousing
- CORROSION PROTECTION of all parts by hot-dip galvanising
- WELDING SEAMS are welded watertight all around



—APPLICATIONS—

The areas of application for panel bridges are determined by the necessities on site. They are used as provisional bridges for construction sites, as engineering corps bridges for the Armed Forces or as emergency relief bridges in the case of emergencies and disasters. They are suitable for vehicle traffic, bicycles and pedestrians. They are also used as provisional railway bridges. When developing the bridge system, we were primarily thinking of temporary usages.

— EMERGENCY BRIDGES

In the event of emergencies and disasters, top priority must be given to maintaining the infrastructure. In the event of floods or earthquakes, for instance, disrupted connections must be restored because the failure of one bridge can paralyse the entire supply system of large areas. Time is of the utmost importance in such cases. Only the quick availability of emergency bridges can ensure that urgently needed routes are rapidly restored.

Emergency bridges are used as:

- **temporary road bridges**
- **heavy-duty bridges** and
- **provisional railway bridges**: With this type of bridge, the customer determines the deck widths and

load. The deck is built as an open deck with longitudinal beams, sway bracing and cross-ties.

— PROVISIONAL BRIDGES ON CONSTRUCTION SITES

Provisional bridges are frequently needed at construction sites. Bridges of this type are used when road traffic or pedestrian traffic must be maintained during the period of construction. The Envi Staving panel bridges are also well suited to meet the needs of the energy, mining, oil and gas industries.

Construction companies profit from the simple installation of Envi Staving panel bridges. Because they can largely be built by their own employees. In addition, Envi Staving offers attractive rental options that are especially handy for short usage periods. For example, we provide merely the supporting structures.

— LINE OF COMMUNICATION BRIDGES

Panel bridges are also outstanding when deployed as engineering corps bridges. For military use, we use bolts suitable for the field as well as various special parts and special assembly tools. For dimensioning the bridge configuration according to military load classes, we have compiled configuration tables for MLC 30–150.



The panel bridge in Klosterneuburg near Vienna was built jointly with the Austrian Federal Armed Forces.

—SYSTEM FEATURES—

The development of the Envi Staving panel bridge is based on the system idea of the “Bailey” bridge. Compared to the latter, however, it features a number of crucial improvements.

— MAIN STRUCTURE

STATIC SYSTEM OF THE PANEL BRIDGE

The carrying system of the Envi Staving panel bridge corresponds to the classic trough bridge with bottom deck.

As a rule, the Envi Staving panel bridge is constructed as a single-span truss bridge (up to a maximum of 80 m). It is possible to implement longer, continuous support structures, or single-span carrier chains, if intermediate supports can be installed.

MAIN STRUCTURE CONFIGURATIONS

The Envi Staving panel bridge is available as a PP30 (Power Panel 30) with a system length of 3.048 m (= 10 ft). System length refers to the length of a panel – to be exact, the distance from bolt centre to bolt centre in the longitudinal bridge direction. This system length equals the distance between the transoms (cross girders) and the length of the deck elements. By multiplying the system length by the number of spans, you can calculate the length of the bridge.

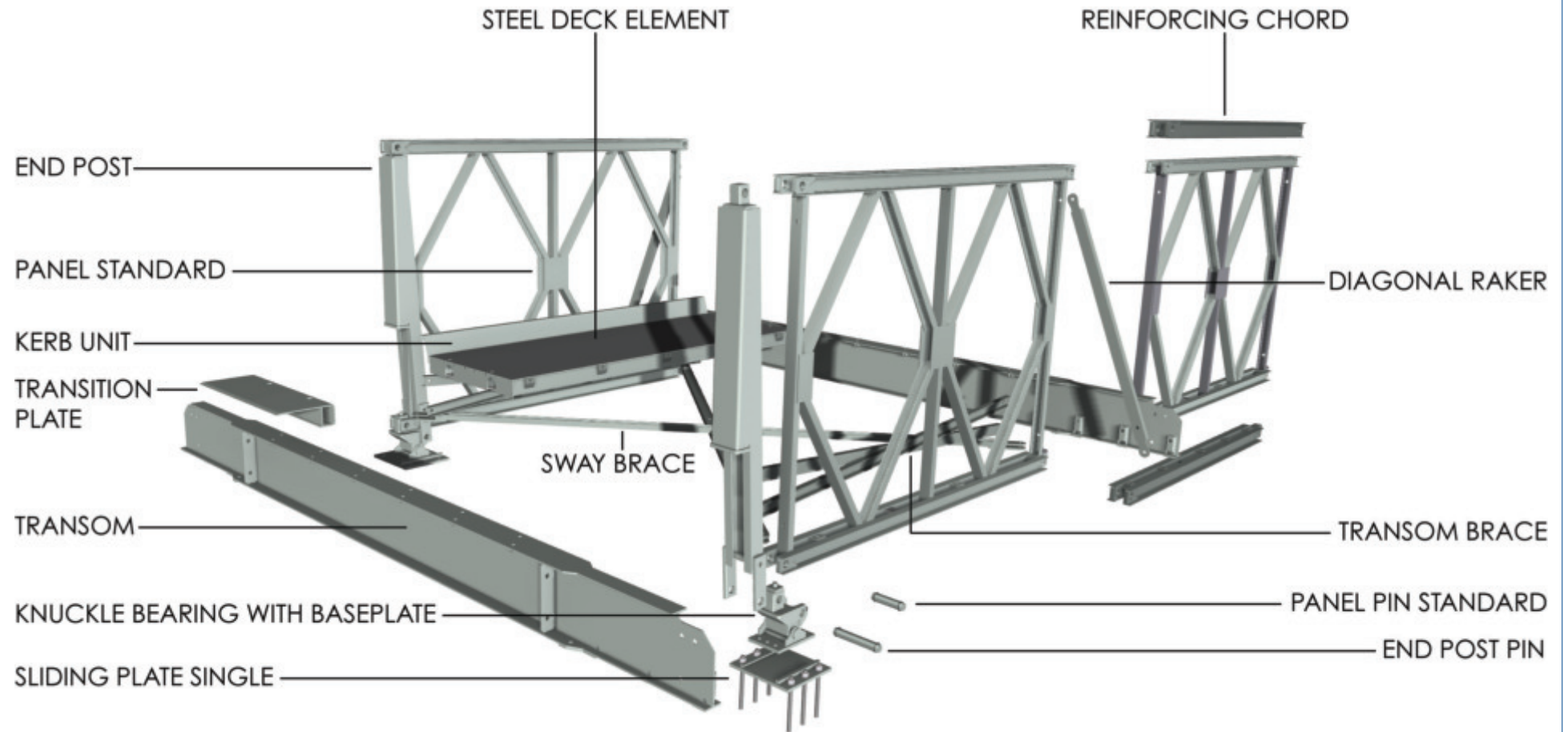
The main structures of the bridge are assembled into a panel wall by connecting several panels in a row by means of bolts. For reasons of statics, it is often required to arrange up to four panel walls next to one another (single-storey) and up to four panel rows on top of one another (four-storey).

If you want to increase the load capacity, reinforcement chords can be screwed to the top and bottom chords of the panels as an additional option. The reinforcement chords are available in three different versions:

- Reinforcement boom LIGHT
- Reinforcement boom MEDIUM
- Reinforcement boom HEAVY

This way, the main structure configuration can be dimensioned quite economically depending on the span length, deck width and load. All possible main structure configurations can be seen in the drawings on page 8.

Unlike the panel bridge systems of other suppliers, the Envi Staving panel bridge features only one type of panel, the standard panel. These panels can be used both in the bearing area and in the centre of the span. Hence it is impossible to mix up the panels and install them the wrong way, since all panels are identical and interchangeable. This results in significant advantages in terms of logistics and safety.



MULTI-SPAN BRIDGES

If a bridge project allows for the option of installing intermediate supports, it is often more cost-effective to build multi-span bridges. This way, a more lightweight configuration often suffices.

There are three options for multi-span bridges:

- **“Broken span” design:** Only the lower bolt for the connection of two panels is installed. The result is a genuine joint.
- **“Distribution beam” design:** By arranging a load distribution beam, it is possible to create continuous support structures and gain a more advantageous stress resultant distribution.
- **“Span junction” design:** This design corresponds to a single-span carrier chain, with the individual span lengths being joined flexibly by special components.

— DECK

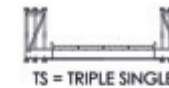
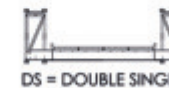
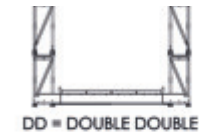
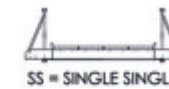
Envi Staving offers the panel bridge with steel or wooden lanes in three different deck widths. In-between sizes are available at special request by the customer.

WIDTH

The deck width is the clear width between the kerbs. Depending on the number of standard steel deck elements laid side by side, three deck widths are available:

- Standard (3 deck elements) with a deck width of 3.15 m
- Extra wide (4 deck elements) with a deck width of 4.20 m
- Double wide (7 deck elements) with a deck width of 7.35 m

Typical standard configurations
Note: special configurations are developed on a case-by-case basis



NOTE: QUADRUPLE TRUSSES (QS.. AND QD..) ARE NON STANDARD CONFIGURATIONS

A panel bridge with DD (double/double) configuration and steel deck.



DECK SYSTEMS

The lane can be implemented as steel or wooden lane:

- **Steel deck:** The “Standard” steel deck elements with a width of 1050 mm span the longitudinal direction from cross girder to cross girder and dissipate occurring traffic loads to the cross girders. For heavy load requirements, specially reinforced heavy-duty decks are available. The galvanised elements are implemented with chequer plates (corrugated sheet) as anti-slip protection; alternatively, they can also be delivered with an epoxy resin coating.

- **Wooden deck:** With respect to the wooden deck, longitudinal steel beams are installed on the cross beams for the traffic. They bear the transverse wooden planks. Longitudinal planks are then put on the load-bearing wooden planks for load distribution and as a wear layer. For pedestrian bridges, the load-bearing wooden planks can run directly from cross beam to cross beam.

RAMPS

Access ramps can be implemented as standardised Envi Staving steel ramps. Their main areas of application are emergency and engineering corps bridges. Optionally, you can erect a concrete wall with subsequent backfilling.

SIDEWALKS

Sidewalks can be implemented either within the main structure (e.g. by elevating one deck element) or else by means of a cantilevering structure outside the main structure, with a width of 1-1.5 m.

— CORROSION PROTECTION

We deliver all bridge parts and fasteners with a high-quality corrosion protection and guarantee a maintenance-free operational life of 20 years:

- All main supporting elements of the panel bridge: hot-dip galvanising in accordance with EN ISO 1461
- Screws: spun galvanised in accordance with EN ISO 1461
- Bolts: sherardising (solids diffusion process) in accordance with EN 13811:2002 (BS 4921:1988)

— INSTALLATION

DESIGN MANUAL

The design manual, the installation manual for panel bridges, contains all important data for the installation of the bridge.

INSTALLATION PERSONNEL

The simplicity and clarity of the system makes it possible to construct a Envi Staving panel bridge even with an inexperienced team. The workers will have understood the system and the structure of the bridge after a few bays and can build the bridge without difficulty.

In the case of complicated designs (e.g. multi-wall, multi-storey and launching), Envi Staving is happy to supervise and monitor the installation. The experience of past bridge-building projects has shown that a team of about ten and a truck with a loading crane can assemble and slide in a bridge without difficulties. Four men and a truck suffice for a simple pedestrian bridge.

EQUIPMENT AND MANAGEABILITY OF THE PARTS

The maximum weight of the individual parts of the bridge is limited to 400 kg, so that a group of 10 men can transport and assemble all parts manually. Only in the “double wide” design with a carriageway width of 7.35 m, the heaviest element – namely, the cross beam at 1,100 kg – can hardly be moved by hand. In most cases, machine support is therefore not needed for the bridge construction. However, experience has shown that a wheel loader/forklift or a small movable crane (HIAB) expedites assembly and alleviates the work of the team. A minimum of machine equipment should be available to the team executing the work.

Transportation of the disassembled bridges to and from the location can be done with normal trucks. Loading and unloading requires burden chains or

textile booms, which are part of the standard equipment of a truck-mounted crane. Besides normal square timber, no special auxiliary materials are required for storage and as underlay for the construction.

All connections of the panel support structure are screwed or bolted. No welding is needed on the construction site. The Envi Staving panel bridge does not require any special tools.

FOUNDATION

For the bearing of the entire structure (bridge supporting structure), the client must provide a sufficiently stable layer or abutment on which the bridge can be set down. Upon contracting, Envi Staving will send the values of the bearing and support forces of the bridge to the client in due time.

TYPES OF INSTALLATION

There are three main options for the installation of the overall support structure:

- launching/slide-in of the bridge
- lifting the bridge into position with a crane
- installation on a sub-structure

Launching of a panel bridge



LAUNCHING

Launching is the usual installation method for emergency and line of communication bridges. In particular for longer bridges, which cannot be lifted into position by a crane due to their weight or for reasons of cost, launching constitutes an interesting alternative.

The bridge is assembled on an assembly site on one side of the obstacle and then pushed over the obstacle by means of standardised sheave/roller batteries. For reasons of statics, it is necessary to install a launching nose from standard bridge elements in front of the bridge, which will be removed again after the launching. Envi Staving offers the necessary launching and roller equipment.

LIFTING THE BRIDGE INTO POSITION WITH A CRANE

The fastest and often easiest method of installation is “lifting into position”. Before the bridge is lifted into position, it must be assembled on a pre-assembly area near the installation location. Subsequently, a movable crane can lift the finished structure onto the prepared bearing unit. This installation method requires the availability of a crane with a sufficient load-bearing capacity. In order to be able to manage the procedure with a smaller crane, it is possible to lift the bridge into position without the deck and then lay the deck elements on the already positioned bridge.

SPECIAL DESIGNS

The following special designs can be implemented with the Envi Staving panel bridge system:

- pylons
- formwork beams
- movable temporary bridges
(swing bridges, bascule bridges, lift bridges)
- pontoon bridges
- suspension bridges

The strongest panel bridge in the world in Algeria, with a maximum load capacity of 512 tons and a span length of 67 metres.



« Envi Staving completed the design, manufacture and delivery to our entire satisfaction. Thanks to Envi Staving we could finish the power station on time. »

Antonio Garcia Vallejo,
Head of Logistics of Iberdrola



—SERVICE—

— BRIDGE SALE

There are good reasons for the actual purchase of a Envi Staving panel bridge. Often, public contracting authorities want to be prepared for future emergencies or disasters and have the right emergency bridges in store. Essential arguments for the purchase of a panel bridge as a provisional bridge on a construction site are the resale value after its use at the site and the re-use of bridges on subsequent sites.

— BRIDGE LEASING

Buying is not always the best option. This is why we also offer panel bridges for rent. Our attractive leasing options are especially advantageous for provisional bridges that are used only for a few months.

— LOAN FINANCING

Envi Staving also facilitates loan financing for the purchase of bridges. With our long-standing experience and in close collaboration with selected banks, we prepare a tailor-made offer for loan financing at attractive conditions for the client.

— DELIVERY FROM STOCK

Envi Staving operates a stock system that ensures that one-lane or two-lane bridges, including the necessary launching equipment, can be delivered immediately should an emergency or disaster make it necessary. This way, a lot of valuable time can be saved in an emergency.

— TECHNICAL SUPPORT

Together with the delivery, our customers are provided with comprehensive technical support from our team of engineers: e.g. statics calculation, system planning, installation instructions and installation monitoring. In addition, we offer a structural analysis of the system certified by a civil engineer and the acceptance of the finished construction by a civil engineer. These offers are often gratefully accepted by public clients.

Panel bridge in rainforest



—PORTRAIT—

—Envi Staving is an internationally active full-service provider for steel bridges and system bridges. The company is headquartered in Vienna and can draw upon over 160 years of experience in bridge construction. The wide range of offers covers all main types of bridges. The reputation of Envi Staving in the core markets of Europe,

Asia, the United Arab Emirates, South America and Africa is based on the premium quality of services, innovative solutions and the systematic orientation toward customer needs. Several thousand bridges built around the world over offer ample proof.—

— REFERENCES

The core markets of the company are located on four continents. Numerous references bear witness to the bridge construction expertise and excellence of Envi Staving.

— RANGE OF SERVICES

Envi Staving is a full-service provider that covers all common types of bridges.

— SYSTEM BRIDGES

- Modular bridges
- Panel bridges

— MOVABLE BRIDGES

- Bascule bridges
- Turn bridges
- Lift bridges

— SPECIAL BRIDGES

- Suspension bridges
- Cable-stayed bridges
- Arch bridges
- Solid-web girder bridges
- Open-web girder bridges
- Tubular bridges
- Steel composite bridges
- Architectural bridges

— FLY-OVER RAMPS

— SERVICES

- Bridge installation
- Bridge maintenance
- Bridge elevation
- Bridge revitalisation

— SUPPORT WITH FINANCING SOLUTIONS



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