

From transition to implementation: ShibataFenderTeam's new catalogue aligned with PIANC 2024



In this interview, WG211 members Dominique Polte and Eduardo Rodero discuss the key updates reflected in the new ShibataFenderTeam (SFT) catalogue, with particular focus on how performance data should be correctly applied within the design framework introduced by the PIANC 2024 Fender Guidelines

In May 2024, PIANC Working Group 211 released the new guidelines for the design, manufacturing and testing of fender systems. Already well known within the industry, these guidelines introduce a design framework that places greater responsibility on designers and owners. This shift requires designers to move beyond simplified selection tools and engage more deeply with the assumptions behind fender performance, particularly in areas such as berthing energy calculation and the use of partial resistance and energy factors.

Following a two-year transition period, the industry is now entering a phase of practical implementation. Manufacturers are publishing updated catalogues to support engineers working under the PIANC Fender Guidelines 2024 framework and to provide performance data that can be correctly applied within the new design methodology.

In this context, and ahead of the release of ShibataFenderTeam's updated Product Catalogue, we spoke with Dominique Polte and Eduardo Rodero, SFT fender experts and members of Working Group 211, to discuss how catalogue data should be used correctly in design practice under PIANC 2024.

In PIANC 2024, designers and owners are expected to play a more active role in understanding how fender performance data is derived and applied. One of the most visible changes in catalogues is the replacement of Rated Performance Data (RPD) with Pre-Set Design Criteria.

How should designers correctly use Pre-Set performance data in practice?

The Pre-Set Design Criteria are intended as a first, quick comparison tool. It allows designers to compare performance data from different manufacturers on the same basis, using defined assumptions for temperature, angle, and velocity. These conditions cover approximately 80 to 90 percent of projects worldwide. This is important because fender manufacturers use different rubber geometries and shapes, which behave differently during compression. Without a common reference condition, it is very difficult to compare performance properly.

In the past, the so-called Rated Performance Data (RPD) served a similar purpose - defining predetermined base conditions so that different products could be assessed on a comparable basis.

The Pre-Set approach is particularly useful in the early stages of a project. For greenfield developments, feasibility studies, or preliminary layouts, designers often do not have complete project data. You might have calculated the berthing energy already based on certain assumption, as detailed information on local temperature, impact angle, or berthing velocity may still be missing. Therefore the next logical step is using pre-set conditions of those fall within the range of assumptions.

In many typical projects, the defined Pre-Set conditions provide a reasonable and practical starting point. However, designers must understand that Pre-Set data is only valid as long as the actual project criteria do not differ significantly from those assumptions.

If project conditions deviate materially - for example in terms of velocity, temperature, or impact angle - it becomes necessary to move to a Base Performance-based approach and apply the appropriate correction factors.

The new Guidelines by WG211 formally defines Base Performance as the fundamental fender performance tested under standard conditions (0° compression angle, standard temperature of $23 \pm 5^\circ\text{C}$, and constant compression velocity of 0.33–1.33 mm/s). This data, previously referred to as CV performance, now has a more clearly defined role within the design methodology described in Chapter 6 of the Guidelines.

What role does Base Performance data play in the PIANC 2024 design methodology, and how should it be interpreted by designers?

Base Performance has two clearly defined roles in PIANC 2024. First, it is the reference performance used during fender testing under standardized constant-velocity conditions. In other words, Base Performance is testing performance. It is determined at a constant slow compression speed, and that speed has nothing to do with the velocity that occurs during actual berthing operations; this distinction is crucial. Secondly, Base Performance serves as the starting point for project-specific performance calculations, when required.

Designers must understand that Base Performance does not represent in-service performance. It is not a baseline for operational conditions. We have seen many cases in the past where fenders were selected or specified directly based on CV values - now Base Performance - without applying the necessary corrections. That approach is incorrect and creates huge liabilities for the designer.

If project conditions differ significantly from the Pre-Set Design Criteria, or if a more precise calculation is required because detailed project data is available, designers must start from Base Performance and apply the appropriate correction factors for velocity, temperature, and impact angle. Only after applying these correction factors, Characteristic Performance and ultimately the Design Energy and Design Reaction be determined in accordance with Chapter 6 of the Guidelines.

Designers should not use Base Performance directly for selection without applying the required correction factors. Doing so can result in an underestimation of in-service reaction forces in the range of 20 to 30 percent. This is not a minor deviation - it can lead to serious design errors and significant liability exposure.

So, Base Performance is essential within the PIANC 2024 methodology - but it must be understood correctly. It is the controlled testing reference and the technical starting point for calculations, not the final design value.

Correction factors for angular contact, temperature, and velocity have long been part of fender design. In PIANC 2024, however, velocity correction has gained greater prominence, particularly in designs that start from Base Performance tested under constant, low compression velocity.

Why has velocity correction become more critical in PIANC 2024-based designs, and what do designers need to understand when applying it?

Velocity factors are not new and have their place in fender designs since the release of PIANC 2002. However, they were more in the background because most catalogues were based on PIANC 2002 RPD values.

Under that approach, the reference velocity was 150 mm/s, and when your baseline is already at that speed, moderate variations - for example from 120 mm/s to 170 mm/s - are negligible. That is why velocity factors in older catalogues, including our own, appeared relatively low.

At a certain point, some manufacturers added CV values to their catalogues, which created confusion in the market. Those values required proper velocity correction to reflect real in-service conditions, and velocity factors therefore became much more visible.

Under PIANC 2024, the role of Base Performance as the starting point for design is clearly defined within the design methodology.

Base Performance is measured at a low constant compression speed. When starting from 2 to 8 cm per minute, the step up to real berthing velocities is huge. It is a completely different speed range. Rubber is a viscoelastic material, which means that its stiffness increases with higher compression speed. When a fender is compressed faster, the material behaves differently, and the performance curve changes - especially in the initial part of the deflection.

For that reason, velocity correction is not a simple parallel shift of the curve. Some may assume that a single velocity factor can be applied uniformly, but that is technically not correct.

The effect on energy absorption and on reaction force is different, and therefore separate velocity factors are required. These factors are established during model testing in the development phase of the fender and must be applied accordingly.

Velocity correction allows designers to account for the specific operating conditions of a project - sometimes even for different berths within the same port. However, this only works if the input data is reliable.

Designers need realistic velocity assumptions, ideally based on measured or verified data from the owner. Without that starting point, it is not possible to determine the final Design Performance correctly. If reliable data is not available, the practical solution is to revert to the Pre-Set conditions, which cover the majority of typical projects.

In previous guidelines, fender testing was addressed only briefly, which led to different interpretations in the market. PIANC 2024 introduces a dedicated chapter on fender testing, with clearer definitions and requirements.

How is the new PIANC testing chapter bringing clarity without changing established good practice?

With PIANC 2024, there is now a dedicated chapter on fender testing. However, the testing practice itself has fundamentally not changed compared to PIANC 2002. What has changed is the level of clarity and formalisation.

In the previous guidelines, certain aspects were not defined in sufficient detail, which led to different interpretations in the market. One example concerns stabilisation cycles before the actual test compression. Under the old guidelines, a manufacturer could perform multiple compressions before the official test cycle. That was technically permissible, but repeated compression heats up the fender, softens it, and reduces the reaction force. This created room to influence test results.

Limits are now clearly defined to avoid such practices. Terminology, test conditions, and reporting requirements are more precisely described. The objective is not to introduce new testing methods, but to ensure consistency, transparency, and avoid unnecessary discussions. SFT's testing procedures were already aligned with the practices now formalised. We have just updated the testing section in our catalogue accordingly for further clarification.



The requirements defined in PIANC 2024 are supported by our global testing infrastructure. Large cell fenders up to size CSS3000 can be tested at our facility in Malaysia. In addition, our new production facility in Sollana, Spain, has been equipped with a hydraulic press that enables testing of large fender units. All in accordance with the updated guidelines.

Overall, the dedicated testing chapter gives designers a clearer framework and better insight into how fender testing is performed. The underlying principles remain the same, but the structure is now more transparent and formally defined.

Much of our discussion has centered on what is new in the catalogue. Yet behind these updates lies a wider change brought by WG211 - a change that reaches beyond numbers and test results, and invites designers to see the fender system as part of a larger, interconnected whole.

In practical terms, what does this more integrated approach to fender system design mean for designers and project teams?

PIANC 2024 formally endorses a holistic approach to fender system design. This is an approach we have been following and advocating for many years. In practical terms, it means that a fender system must not be treated as a standalone component added at the end of

a quay wall design. It must be integrated into the overall berth structure from the early design stages. In the past, it was common to design the substructure first and then select a fender system from a catalogue to fit on what was given. However, the fender system introduces forces into the quay wall, and if the substructure is not properly sized for those forces, failures will occur. A fender system cannot compensate for shortcomings of the quay wall design.

Many fender failures in the market are not the result of product deficiencies, but of fragmented design approaches. When systems fail, the first reaction is often to point at the fender manufacturer.

In reality, the root cause frequently lies in inadequate integration of vessel characteristics, operational limits, and substructure design and the unwillingness of some stakeholders to design the fender system and quay wall in one approach.

PIANC 2024, again, clearly reinforces that responsibility lies with designers and owners to provide correct project input. The fender manufacturer does not design the quay wall, what we provide is technical input on sizing, loads, and system behavior. A fender system should not be designed to overcome structural limitations. It should be integrated into a quay wall design that is robust, balanced, and aligned with the operational goals of the terminal.

Ultimately, this is a question of total cost of ownership. Saving a small amount of concrete during construction may appear efficient in the short run. However, if the result is recurring fender damage, operational downtime, and premature replacement, the long-term costs are significantly higher.

A balanced design must consider vessel characteristics, berthing energy, substructure capacity, and long-term operational requirements together from the outset. For that reason, early engagement with experienced fender manufacturers is essential.

As the transition period for the PIANC 2024 Fender Guidelines comes to an end, the industry is moving from interpretation to practical implementation. The updated ShibataFenderTeam fender catalogue, to be released in the coming weeks, is intended as a practical reference for designers working within this new framework.

With manufacturers across the industry updating their catalogues, the direct involvement of Dominique Polte and Eduardo Rodero in PIANC Working Group 211 provides valuable insight into how the guidelines are meant to be applied in real projects.

In this context, ShibataFenderTeam is well positioned to support designers and other stakeholders as PIANC 2024 becomes the reference for future fender system design. 