Appendix A

If there is any discrepancy between the Japanese version and the English version, the Japanese version prevails.

	Judgement Standard	Examination method	Required	App.1	№
Conditioning room to stabilize the maximum size fender.	Is a sufficient space secured for the conditioning room(constant temperature chamber) considering the size of the fender, the frequency of testing, the storage period, etc.?	Confirm the dimension W × L × H by the drawings of the conditioning room.	Drawings, photos	3-1	**1**
		Check the maximum size and number of fenders that can be accommodated in the conditioning room.	Drawings, photos, materials	3-1	**2**
	Is the target temperature 23 (standard temperature) ±5℃ set and achieved? 【Technical standard and commentaries】 Is stored at a constant temperature of ±15℃.【PIANC】	Confirm the record of the conditioning room for the target temperature 23 (standard temperature) ± 5℃. Confirm annual temperature data.	Annual temperature record, graph	3-1	**3**
	Is the temperature records measured the ambient temperature within 3 m from the fender surface continuously or twice per day at intervals not exceeding 10 hours. 【PIANC】	Confirm that the temperature in the conditioning room is measured automatically and transfer data to the server/disk automatically or manually with time record, or confirm the temperature measured record by hand writing is recorded properly as primary data and input to the server /disk.	SOP(Standard Operating Procedure), Temperature record, phots, drawings	3-1	**4**
	Is the stabilizing temperature time $20X^{1.5}$ days or longer than this calculated time recommended by the manufacturer (X is the rubber thickness [m])? 【PIANC・CDIT】	Confirm the method of stabilizing temperature time setting (PIANC formula or original method) and constant temperature setting time for each fender.	SOP, stabilizing time table	3-1	**5**
	Is the actual time to stabilize fender temperature longer than setting time?	Confirm the management method, record method and the data record to secure the actual time to stabilize fender temperature (entry/exit time of conditioning room)	SOP, Record of time and temperature, actual facilities	3-1	**6**
Compression test apparatus to compress the maximum size fender to maximum deflection.	Is the maximum size fender in height or length placed on the compression apparatus?	Confirm the size relationship between compression test apparatus and fenders by using drawing, photos, and etc.	Drawings, photos	3-2	**7**
	Is the loading force satisfied for maximum reaction force of fenders?	Confirm the materials showing the relationship between the recorded or estimated maximum reaction force of the largest fender at the initial compression and the maximum compressive loading value of the compression test apparatus. If there is no record of maximum reaction fender compression test, estimate the maximum reaction force based on the past data and confirm the estimation result.	Test machine specifications, etc., catalogs, past performance data, records, photos, etc.	3-2	**8**
	Is the stroke of compression test apparatus sufficient to the deflection of fenders.	Confirm the materials showing the relationship between the maximum compression deflection of the fender and the compression stroke of the compression test apparatus.	Specifications, Catalogs, Materials	3-2	**9**
		Confirm the material showing the fenders have been compressed to their maximum deflections.	Test records, photos	3-2	**10**
	In case of CV method, constant slow speed , 0.01 to 0.3%/s, is realized. 【Technical standard and commentaries ・CDIT】 0.0003～0.0013m/s（2～8 cm/min.） 【PIANC】	Confirm the materials showing how to determine the compression speed and the table of the set compression speeds of each fender. The actual compression speeds and the past records are checked on site.	SOP, Compression speed table/record	3-2	**11**
		Confirm the displacement, reaction force and time are recorded simultaneously, and compression speed for every deflection can be shown. Check the variation of compression speed to confirm whether the compression speed is appropriate.	SOP, Record/statistics of compression speed for each displacement	3-2	**12**

	Judgement Standard	Examination method	Required	App.1	№
Validity of recorded data (no room for fraud)	Fundamentals of Fraud Prevention. Confirm the countermeasure of system infrastructure for data fraud prevention.	Confirm the quality assurance organization independent from manufacturing, technology (design and development), sales, and etc. has been established and the quality assurance manager is assigned. Confirm the organization chart to show the department and manager to manage testing, inspection, testing facilities, software and data store.	SOP, organization chart, etc.	3-3	**13**
		It is preferable to use intra-net server, because login capture, access log management, data archive, data back-up and usage of unified clock are required. If stand-alone system is adopted, confirm this system has the same functions as above.	SOP, Actual machine, system configuration diagram, data flow diagram	3-3	**14**
		Passwords or biometric authentication is required to log-in to the system. Confirm the system can record "system user" that is identified by log-in capture and access log can be retention for the required period.	SOP, Actual machine, records, access logs	3-3	**15**
		In order to avoid time conflicts, confirm that the server's clock, which cannot be changed by the user, is managed and utilized as a common time when using the system. If the server time is not set as a common time, check the time management method and confirm that there is an equivalent function.	SOP, Actual machine, Time recording between different devices, etc.	3-3	**16**
	Fundamentals of Fraud Prevention. Are the data to be acquired and recorded in the compression test properly stored?	Confirm the document that stipulates that "system users and system usage time" must be recorded electronically and "when, by whom" must be recorded on paper. These records are checked separately on site.	SOP, record	3-3	**17**
		Confirm the information to identify the fender, such as model type, size, rubber grade, production number, production date user data, and etc.	SOP, record	3-3	**18**
		Confirm the materials to stipulate that the primary data (displacement, reaction force and time) shall be recorded on a server or other device without any processing at the same time as the compression test or before the next process. Confirm that such control is being performed with SOP and actual machine testing.	SOP, Actual machine record, Flowchart etc.	3-3	**19**
		Confirm that the primary data (displacement, reaction force, time) recorded during the compression test are recorded with a displacement increment of 1 mm or less, a compressive strain increment of 1% or less, or 1 second or less.	SOP, record	3-3	**20**
		Confirm the final performance data and curve that are obtained by processing primary data are recorded.	SOP, record	3-3	**21**
	Are the data retention period and methods appropriate?	Confirm the primary data are stored in legible.	SOP, record	3-3	**22**
		The test data retention period shall be set the duration of use to confirm the specified quality of the products. However, if the test data with the methods and procedure for creating test report from test data are passed to the owner, the fender manufacture can set the test data retention period 25 years from the date of shipment.	SOP	3-3	**23**
		Confirm that test data including the primary data are stored (archived) in two or more independent locations or methods, and that at least one of them can be read at any time. In addition, back-up that is temporary stored and overwritten for recovering from accident, and etc. is deferent from archive that is stored in the required period without any editing or deleting. Confirm correct data archive is conducted.	SOP, data flow diagram, etc.	3-3	**24**
		Confirm the archived test data including the primary data are read only and can't be edited, overwritten or deleted in principal.	SOP, actual machine	3-3	**25**

	Judgement Standard	Examination method	Required	App.1	№
Validity of recorded data (no room for fraud)	Are the access privileges to the archived primary data appropriate?	Confirm the access privilege for read only is given to the quality assurance manager who investigates archived data periodically to check any fraud or falsification. And confirm that the access privileges are granted only to those who are not related to the archived data content, such as IT managers, system managers, equipment managers, and etc., other than the quality assurance manager. Confirmed that related departments with conflicts of interest such as manufacturing, technology (design and development), sales, and etc. cannot access to the archived data.	SOP, list of access rights, etc., actual machine, etc.	3-3	**26**
		Exceptionally, when editing or deleting archived test data, the authority is appropriately set, such as only the quality assurance manager (including the system manager in the case of electromagnetic records) can do it. Confirm that it is granted and measures to prevent data fraud are established. Confirm that the history of the editing or deletion is recorded, and that the record is regularly checked by the quality assurance manager. If you want to be able to edit and change as well as view, it is essential to have an audit trail that shows who did what when, check the function, check the check record. We also confirmed that the data can be reconstructed. This item does not apply if it cannot be changed even in exceptional cases.	SOP, actual machine, record	3-3	**27**
	Are the access privileges to computer system for the compression test appropriate?	Confirm the access privileges to computer system for the compression test are restricted for the dedicated operators. And confirm that the access privileges are granted only to those who are not related to the data content, such as IT managers, system managers, equipment managers, etc., other than the quality assurance manager.	SOP, actual machine	3-3	**28**
	Data fraud prevention. Has all procedures been automated from test starting to test report creation? (Compression test) Break-in specimen by deflecting one or more times to its rated deflection, or more, as recommended by the manufacture. 【PIANC ・Technical standard and commentaries ・CDIT】 Performance test: Remove load from specimen and allow it to "recover" for at least one hour. 23±15°C 【PIANC】 one compression after "recover" for at least one hour. 23±5°C【Technical standard and commentaries】	Confirm the actual compression test follows SOP that stipulates the detail procedure from break-in compression to the final performance test. And make sure there is no room for data fraud.	SOP, test at actual equipment	3-3	**29**
		Confirm the level of automation of all test condition settings, such as whether the compression speed is set automatically or in advance, and automatic start/end. And confirm the measured data not for automated items are recorded properly.	SOP, actual machine, record	3-3	**30**
		Confirm the level of automatic for 3 times pre-compression and performance test including interval time. And confirm the method and recording for manual processes.	SOP, actual machine, record	3-3	**31**
		Confirm the additional pre-compression methods. (Especially how to set the time interval and number of pre-compressions) Check the statistical data of the number of pre-compressions.	SOP, Pre-compression count data	3-3	**32**
		Confirm the methods to secure relaxation time of one hour or more at 23±5°C and the past record of temperature and time.	SOP, actual machine, record	3-3	**33**
		Confirm automatically recorded data. Confirm all data of the actual apparatus compression test of this examination.	SOP, actual machine, record	3-3	**34**
		Confirm displacement value, reaction force, time and performance curve can be displayed on the monitor during compression test and can be printed them out.	SOP, actual machine, photos, output data	3-3	**35**
		Confirm all compression test data (displacement, reaction force and time) and performance curve of this examination can be displayed on the monitor and printed them out. Confirm these data and recorded primary data must be same.	Actual machine, record	3-3	**36**

	Judgement Standard	Examination method	Required	App.1	№
Validity of recorded data (no room for fraud)	Data fraud prevention. Has all procedures been automated from test starting to test report creation? (Temperature of compression test) As long as ambient temperature at the test apparatus is within 23±15°C and testing is completed within two hours. 【PIANC】	Confirm the ambient temperature(23±15°C) of compression test apparatus is measured automatically and recorded them to the server/disc with time automatically or manually. Or confirm these temperature data with time that are printed or written on the paper ,and confirm these data are input and saved to the server/disc as primary data. Also confirm these within the allowable temperature range.	SOP, actual machine, annual temperature record	3-3	**37**
		If temperature correction is required, confirm it is conducted correctly.	SOP, record	3-3	**38**
		Confirm compression test could be completed within 2 hours by checking test time record. Confirm the records for stabilizing time and temperature, when exceeding 2 hours.	SOP, temperature and time record	3-3	**39**
		Confirm measuring specimen surface temperature during or before/after compression test and record them to the server/disk as primary data. Or confirm the paper records were correctly stored as primary data.	SOP, actual machine, record	3-3	**40**
	Data fraud prevention. Has all procedures been automated from test starting to test report creation? (Automatic test report creation)	The materials that explain how to perform from primary data collection to the test report creation without human intervention. Check the documented configuration specifications and flow charts of hardware and software. And check the program if possible. Confirm the actual process at site separately.	SOP, actual machine, Hardware/software configuration specifications, flow charts, etc.	3-3	**41**
		If the process from the start of the test to the creation of the test report is partially manual, confirm that the set values entered in the manual process and the details of the processing and correction applied to the primary data be recorded as test data.	SOP, actual machine, record	3-3	**42**
		Confirm the pass-fail decision is made automatically. Confirm the judgement method that absorbed energy and reaction force satisfy the required performance is reasonable. And confirm compression test is conducted up to maximum design deflection and the performance curve is drawn up to maximum design deflection.	SOP, Program specifications, records	3-3	**43**
		If temperature correction is required, confirm that primary data are stored without any process and the correction history is recorded.	Record	3-3	**44**
		Confirm that customer information, fender information, time, compression speed, maximum reaction force, absorbed energy, inspector, atmosphere temperature, number of pre-compressions, and performance curve up to design maximum deflection are correctly described in the test report.	SOP, record	3-3	**45**
		Confirm that the format of test report can not be changed or edited by anyone(PDF, etc. with edit-prohibited settings) and is recorded with time automatically. And confirm the record of changing and editing.	SOP, actual machine, record	3-3	**46**
		Confirm that the computer program and machine for compression test can't be modified or changed by the organization of testing without any permission and SOP described it. And confirm the record of modifications and changes.	Documents and records such as SOP	3-3	**47**
	Is it possible to reconstruct the final data from archived data.	The quality assurance manager confirm to reconstruct the final data that were submitted to the customers from archived data and not to detect any data fraud periodically or all data. Confirm the record of them.	SOP, record	3-3	**48**
		Confirm that there was no data fraud by checking that the some examples from the past test list to compare with the primary data of the test and the test report.	Test List, Test Report	3-3	**49**
		Confirm that the records were periodically checked by the Quality Assurance Manager to ensure that archived primary data has not been altered, overwritten, or deleted.	SOP, record	3-3	**50**
		Confirm SOP stipulates the procedure and recording of programs and machines updating. And confirm the information obligation to the related department and organization.	SOP	3-3	**51**
	Education and monitoring of inspectors.	Confirm SOP and training record for the inspectors.	SOP, record	3-3	**52**
		Confirm the record of surveillancing the implementation of SOP for inspectors.	SOP, record	3-3	**53**

	Judgement Standard	Examination method	Required	App.1	№
Calibration for loadcell	Are load cells and amplifiers properly certified? All equipment that measures and records force and displacement must be calibrated and certified to an accuracy of ±1% according to ISO or corresponding JIS or ASTEM requirements. [PIANC]	Verify the certification that was calibrated both load cell and amplifier at the same time.		3-4	**54**
		Confirm that calibration value is protected by the tampering prevention measures as password lock or tampering prevention sticker.	SOP, actual machine	3-4	**55**
		Verify the certification of displacement meter.	Record	3-4	**56**
	Are inspections, calibrations, and certifications of other testing machines and measuring instruments conducted appropriately?	Check the list of other testing machines and measuring instruments used and their inspection, calibration, and test records.		3-4	**57**
Performance curves and correction factors	Is making performance curve (deflection, reaction force and energy absorption) properly?	In order to make performance curve difficult to falsify, confirm that plots with displacement increments of 1 mm or less or compression strain increments of 1% or less were created.	SOP, actual machine, record	4-1	**58**
	Break-in deflection shall be mandatory for all fenders with catalogue reaction rating of 100 tones or more to be installed on monopiles or pile-supported pier structures. Break-in deflection of other fenders shall be as stipulated by customer. 【PIANC】	Confirm that SOP stipulates break in must be conducted when break-in conditions are satisfied, even though customer didn't requested. And confirm implemented record. In case of multiple fenders are conducted break-in at the same time, confirm the record of the performance data.	SOP, record	4-1	**59**
	Are the correction coefficients (temperature coefficient, speed coefficient) set appropriately? 【CDIT】	Confirm that temperature factors and speed factors were collected from each fender model type and rubber grade.	Coefficient list, graph	4-1	**60**
		Confirm the specimen size and test procedures.	SOP	4-1	**61**
		Confirm temperature factors and speed factors satisfy an empirical equation associated with time–temperature superposition(William-Landel-Ferry equation). It must be smooth and continuous.	Materials, record	4-1	**62**
		Confirm the execution record of temperature correction and speed correction.	Record	4-1	**63**
statistics of past testing records	Are test data managed properly?	Confirm statistics analyze like as histogram for fender model type, size and rubber grade is conducted by the quality assurance manager who can access to the archived data.	Statistical materials such as histograms, analysis reports, etc.	4-2	**64**
		Confirm the soundness of statistical data. And confirm improvement is considered and implemented.	Records, analysis re	4-2	**65**
	Are there rules in place for rejecting products?	Confirm rejected product processing rules.	SOP	4-3	**66**
	Is it properly implemented based on the rejected product regulations, and is the record managed?	Check rejected product processing record and confirm that the root cause of occurrence was scientifically analyzed, and that recurrence prevention measures were scientifically established and improved.	Records, root cause analysis, recurrence prevention	4-3	**67**

	Judgement Standard	Examination method	Required	App.1	№
Physical property test	Confirm that the standard values of "physical properties of rubber" are satisfied, and If those were not satisfied, are the regulations prepared and property implemented?.	Confirm the statistical data of "rubber physical properties", and that those are satisfied standard values.	Statistical data, etc.	5-1	**68**
		Confirmed that the processing method is specified when the physical property test fails. And confirm the records that it is processed properly and the recurrent prevention is conducted.	SOP, record	5-1	**69**
	Accelerated aging test Heat aging resistance: Conforms to JIS, ASTEM or ISO. Same sample at 70±1°C for 96 hours	Confirm that the forced circulation heat aging tester (longitudinal air type) is applied according to JIS K 6257 accelerated aging test (AtA-2), with a temperature accuracy of ±1°C and a wind speed range of 0.5 to 1.5m/s. Check the calibration certificate and check the frequency of calibration.	Specifications, Actual machine, Calibration certificate, etc.	5-2	**70**
		Confirm the record that heat aging is executed at 70±1°C×96+0-2 hours. Even if the records were handwriting, confirm that the records were made in a way that conformed to the correct data consistency*5, and records were confirmed by the Quality Assurance Manager that the values in the final test report were consistent.	SOP, actual machine, record	5-2	**71**
	Tensile test for accelerated aging test Tensile strength: 80% or more of the value before aging Elongation: 80% or more of the value before aging 【Standard Specifications, PIANC, etc.】	Confirm that the test is conducted in accordance with JIS K 6250. Confirm the annual temperature record of the laboratory that the room temperature should be 23 ± 2°C. Confirm the records that the correct dumbbell shape and thickness (maximum 3 mm, difference within 2%) are realized according to JIS K 6251. In addition, the punching die for the dumbbell is prefer to adopt the rather type such as "super dumbbell", which has good dimensional accuracy and is less likely to cause crazes. The tester complies with JIS K 6272, and it is desirable to automatically record the load, and the accuracy is grade 1. Elongation is measured by contact or optical method between gauge lines, and the maximum permissible error of the measuring device is within ±2%. The test results are automatically recorded on the disk of the tester. In addition, it is desirable to be able to check the monitor during the test and print it out after the test. It is utilized as the primary data by an appropriate method. Confirm the record that the quality assurance manager confirms that the values in the record and the final test report are consistent.	Test room temperature record, SOP, dumbbell shape measurement record, actual equipment, Data confirmation record	5-2	**72**
	Durometer hardness test (type A) for accelerated deterioration test Hardness: Do not exceed +8 of the value before heating (Shore A) 【Standard Specifications, PIANC, etc.】	Confirm the test complies with JIS K 6253-3. Also, check the calibration certificate that has been calibrated correctly. Even if the records were handwriting, confirm that the records were made in a way that conformed to the correct data consistency*5, and records were confirmed by the Quality Assurance Manager that the values in the final test report were consistent.	SOP, actual machine, calibration certificate, record	5-2	**73**
	Ozone resistance test Ozone Resistance: Conduct ozone test with one of the following test criteria. JISK6259, 40°C, 20% elongation, 50pphm ASTM D1171(A), 38°C ISO1431-1, (A), 40°C, 20% elongation, 50pphm No visible cracks after 72 hours [Standard Specifications, PIANC, etc.]	Confirm that the static ozone deterioration was performed correctly at JIS K6259-1 50±5 pphm, 20±2% extension, 40±2°C x 72 hours. Confirm with a calibration certificate that the requirements of JIS are met, and also confirm the frequency of calibration.		5-2	**74**
		The results are recorded as detailed observation results and photographs, and recorded as primary data*5. Also, leave a sample if possible.	SOP, actual machine, record	5-2	**75**
	Confirmation of physical property test transcripts issued by a testing agency, etc.?	Confirmation of a physical property test transcripts issued by a testing agency within the last three years. In addition, it is acceptable to use the transcripts used for the rubber fender durability certificate as it is. Rubber grades are the both hardest and softest.	Physical property test certificate	5-2	**76**
	Correct a portion of the tested product and submit it to the supervisory staff. [special specifications]	Confirm SOP stipulates that fenders subjected to compression tests should secure the weight of burrs specified in the contract documents, etc., so that the cause in the event of a problem can be investigated by analyzing the composition of the sample, and confirm the record of implementation.	SOP	5-3	**77**

	Judgement Standard	Examination method	Required	App.1	№
Data Fraud prevention management	Is the senior manager taking action to eliminate motive or pressure and rationalization of fraud triangle?	Confirm the policy, etc. to prevent rationalization to data fraud is issued by the senior manager who directs and manages the company at the highest level, who have the authority and responsibility to allocate the company's resources.	Policy	6-1	**78**
		Confirm the materials and records that senior management or the organization/institution instructed by senior manager acted or monitored to prevent the data fraud by the person in charge from pressure from sales, manufacturing technology or the external organization.	SOP, record	6-2	**79**
	Are employees and personnel in charge appropriately trained in data fraud prevention?	Employees shall be made aware of the importance of their role and must be trained to understand it. Employees shall agree to follow the data integrity policy.	SOP, record	6-4	**80**
		The main members including quality assurance personnel are required training to prevent and detect data fraud. And confirm the training record.	SOP, record	6-4	**81**
		Confirm the level of penetration of data reliability improvement among employees.	SOP, record	6-3	**82**
		Confirm the review of education records by the senior management.	SOP, record	6-4	**83**
	Can be created Open Corporate Culture and constructed the atmosphere that employee can speak out immediately if a problem happens?	Confirm senior management should actively discourage any management practices that might reasonably be expected to inhibit the active and complete reporting of such issues, for example, hierarchical constraints and blame cultures.	SOP, record	6-5	**84**
		Confirm the internal reporting rules and company policies based on the Whistleblower Protection Act.		6-5	**85**

Reference

Standard Specifications:	**Standard Specifications for Port and Harbor Works** by Ports and Harbors Bureau, Ministry of Land, Infrastructure, Transport and Tourism
Technical standard and commentaries:	**Technical Standard and Commentaries for Port and Harbour Facilities in Japan** by The Overseas Coastal area Development Institute of Japan
CDIT:	**Guidelines for Design and Testing of Rubber Fender Systems** by Coastal Development Institute of Tecnology
PIANC:	**Guidelines for the Design of Fenders Systems:2002** by Permanent International Association of Navigation Congresses