RULES FOR TESTING MACHINES

GUIDANCE FOR TESTING MACHINES

Rules for Testing Machines **2022 AMENDMENT NO.1**

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Rule No.59 / Notice No.44 30 June 2022

Resolved by Technical Committee on 26 January 2022

ClassNK

NIPPON KAIJI KYOKAI

An asterisk (*) after the title of a requirement indicates that there is also relevant information in the corresponding Guidance.

RULES FOR TESTING MACHINES

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2022 AMENDMENT NO.1

Rule No.59 30 June 2022

Resolved by Technical Committee on 26 January 2022

An asterisk (*) after the title of a requirement indicates that there is also relevant information in the corresponding Guidance.

Rule No.59 30 June 2022
AMENDMENT TO THE RULES FOR TESTING MACHINES

“Rules for testing machines” has been partly amended as follows:

Chapter 1 GENERAL

1.1 General

1.1.1 Scope

Sub-paragraph -1(2) has been amended as follows.

1 The Rules apply to testing machines, and other related devices, hereinafter referred to as testing machines, etc. specified in the following **(1)** to **(4)** to be certified by the Society.

(1) Testing machines and associated equipment used for determining mechanical properties including strength, rigidity and hardness of materials or products.
(2) ~~Force proving instruments for verifying material testing machines and r~~Reference test pieces for verification of testing machines.
(3) Items similar to those mentioned in **(1)** and **(2)** above, such as loading devices.
(4) Other items deemed appropriate by the Society.

1.2 Inspections

1.2.2 Place of Inspection*

Sub-paragraph -2 has been amended as follows.

2 Inspections of ~~force proving instruments and~~ reference test pieces are to be carried out at the place where the Society’s reference machines are located.

1.2.4 Execution and Due Date of Inspection*

Sub-paragraph -2 has been amended as follows.

2 The renewal inspection specified in **Chapter 2** and subsequent Chapters is to be carried out according to the type of testing machines, associated equipment and ~~calibration devices~~ force proving instruments (hereinafter referred to as the “testing machines and equipment”) in the following cases **(1)** through **(3)**, in order to verify whether the requirements specified in the relevant Chapters have been complied with or not. However, records of the maintenance works on important components done prior to undergoing a renewal inspection are presented, and when the quality management for the maintenance works are to be deemed appropriate by the Society, a part of the inspections are to be omitted. In case of **(2)** and **(3)**, the Society may require to carry out an inspection equivalent to the initial inspection.

(1) When certificate is to be renewed.
(2) When the safety device and principal parts of testing machines, associated equipment and calibration devices are to be changed.
(3) When testing machines and associated equipment are to be reinstalled (excluding hardness testing machines).

1.3 Certificates, etc.

1.3.1 Issue of Certificates, etc.

Sub-paragraph -2 has been amended as follows.

1 Certificates, inspection records and identification plates will be issued by the Society for the testing machines that have been verified to be in compliance with the Rules.
2 Certificates and inspection records will be issued by the Society for ~~force proving instruments and~~ reference test pieces that have been verified to be in compliance with the Rules.
3 The owner may apply for reissuance of a certificate when the valid certificate is lost or damaged.

Paragraph 1.3.3 has been amended as follows.

1.3.3 Renewal of Certificates

~~**1**~~ The renewal interval of a certificate for a testing machine and associated equipment is, in principle, not to exceed twelve *months*.
~~**2** The renewal interval of a certificate for a force proving instrument used for verifying material testing machines is, in principle, not to exceed twenty-four *months*.~~

Paragraph 1.3.4 has been amended as follows.

1.3.4 Invalidation of Certificates

A certificate may be invalidated in any of the following cases ~~**(1) through (4)**~~
(1) When testing machines and equipment are not subjected to the inspection specified in **1.2.4-2**.
(2) When the inspection results of testing machines and equipment are regarded as being unsatisfactory by the Society.
(3) When a certificate is returned by the owner.
(4) When the inspection fees specified in **1.4** and other charges stipulated by the Society are not paid.
(5) When an adjustment that affects accuracy is performed.
(6) When an abnormality or a failure that affects accuracy is confirmed.
(7) When the testing machine is relocated.

1.3.5 Markings*

Sub-paragraph -2 has been amended as follows.

2 ~~Force proving instruments and r~~Reference test pieces are to be marked with particulars as deemed appropriate by the Society.

Chapter 3 CHARPY PENDULUM IMPACT TESTING MACHINES

3.1 General

3.1.3 Definition

Sub-paragraph (4) has been amended as follows.

(1) anvil: The portion of the base of the machine forming a vertical plane which restrains the test piece when it is struck by the pendulum. The plane of the supports is perpendicular to the plane of the anvils.
(2) striker: The portion of the hammer that contacts the test piece; the edge that actually contacts the test piece may have a radius of 2 *mm* (the 2 *mm* - striker) or a radius of 8 *mm* (the 8 *mm* - striker).
(3) test piece supports: The portion of the base of the machine forming a horizontal plane upon which the piece rests prior to being struck. The plane of the supports is perpendicular to the plane of the anvils.
(4) actual absorbed energy: The total energy required to break a test piece when tested by a testing machine. ~~It is equal to the difference in the potential energy from the starting position of the pendulum to the end of the first half swing during which the test piece is broken.~~
(5) nominal initial potential energy: The energy assigned by the manufacturer of the testing machine.

3.4 Initial Inspection

3.4.2 Inspection of Function*

Sub-paragraph -1 has been amended as follows.

1 Impact test

Impact test is to be carried out with a square test piece of which the absorbed energy is approximately 90% of the nominal initial potential energy. It is to be verified that the performance of each structural component of the testing machine is satisfactory to test normally, and the condition of the installation is to be inspected. Particularly, the bearing portion of the rotating shaft of the pendulum and the mounted part of the ~~test piece support and~~ anvil, are to be verified to ensure that their rigidity is such that their deformations and vibrations at the moment of breakage of the test piece are extremely small.

Chapter 4 HARDNESS TESTING MACHINES

4.3 Rockwell Hardness Testing Machines

4.3.2 Construction and Function of Testing Machines

Sub-paragraph -1 has been amended as follows.

1 Forcing an indenter into the surface of a test piece in two steps (the preliminary test force and the total test force (the preliminary test force plus the additional test force)), a testing machine is to be capable of measuring the permanent depth of indentation under the preliminary test force after removal of the additional test force. The motions of the testing machine are to be smooth. ~~The preliminary test force and the total test force are given in **Table 4.1.**~~

Table 4.1 has been deleted.

~~Table 4.1 Preliminary Test Force and Total Test Force for Testing Machine~~

	~~Preliminary test force~~	~~Hardness scale~~	~~Total test force~~	~~Hardness calculating formula~~
~~Rockwell hardness~~	~~98.07 *N*~~	~~*C*~~	~~1471.0 *N*~~	~~100-500 *h*~~
		~~*B*~~	~~980.7 *N*~~	~~130-500 *h*~~
~~Rockwell superficial hardness~~	~~29.42 *N*~~	~~30 *N*~~ ~~30 *T*~~	~~294.2 *N*~~	~~100-1000 *h*~~

~~Note:~~

~~*h* : The permanent increase of depth of indentation from reference position under preliminary test force after removal of additional test force (*mm*)~~

Chapter 5 has been deleted.

Chapter 5 ~~FORCE PROVING INSTRUMENTS USED FOR THE VERIFICATION OF UNIAXIAL TEST MACHINES~~(Deleted)

~~5.1 Scope~~

~~5.1.1 General~~

~~The requirements of this Chapter apply to the elastic force proving instruments (hereinafter referred to as the "force proving instruments") used for the static force verification of uniaxial force of material testing machines.~~

~~5.2 Construction~~

~~5.2.1 Construction~~

~~**1** Force proving instruments are to be provided with a device indicating the deformation corresponding to the force applied thereto, and it to be so constructed that it can sufficiently withstand being used up to the weighing capacity. The force proving instruments are not to generate any changes due to its being transported or moved.~~

~~**2** Force proving instruments are to be such that the relationship between the force applied and the elastic deformation of the device is sufficiently stable under the specified temperature of the environment, and is capable of indicating the change in force without remarkable lead or lag.~~

~~**3** The force bearing portion of a force proving instrument is to have such a construction that an axial force can be applied correctly on the device without causing any erroneous changes in the indication of the device.~~

~~5.3 Initial Inspection and Renewal Inspection~~

~~5.3.1 General*~~

~~**1** The safety of a force proving instrument for operators is to be confirmed.~~

~~**2** The effectiveness of the device and construction specified in 5.2 above is to be verified.~~

~~5.3.2 Inspection of Function*~~

~~**1** Overloading test~~

~~At the Initial Inspection, the force proving instruments are to be subjected to an overload which exceeds the maximum force by a minimum of 8% and a maximum of 12% in 4 times succession. The overload is to be maintained for a period of 1 *min* to 1.5 *min*.~~

~~**2** Calibration of the force proving instruments~~

~~The force proving instruments are to be calibrated with the Society's reference machines according to the procedures deemed appropriate by the Society.~~

Chapter 6 REFERENCE TEST PIECES FOR CHARPY PENDULUM IMPACT TESTING MACHINES

6.2 Material

Paragraph 6.2.1 has been amended as follows.

6.2.1 Material*

Reference test pieces are to be of material deemed appropriate by the Society and to be produced under the quality control to which a special attention is to be paid, on the melting, the rolling, the heat treatment and the machining of the material etc. in order to obtain an uniform strength throughout each ~~lot~~ batch.

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 30 June 2022.
2. Notwithstanding the amendments to the Rules, the current requirements apply to the testing machines and force proving instruments for which the application for survey is submitted to the Society before the effective date.

GUIDANCE FOR TESTING MACHINES

GUIDANCE

2022 AMENDMENT NO.1

Notice No.44 30 June 2022

Resolved by Technical Committee on 26 January 2022

Notice No.44 30 June 2022
AMENDMENT TO THE GUIDANCE FOR TESTING MACHINES

"Guidance for testing machines" has been partly amended as follows:

Chapter 1 GENERAL

1.2 Inspection

1.2.4 Execution and Due Date of Inspection

Sub-paragraph -1(4) has been deleted.

1 The wording "principal parts of testing machines" referred to in **1.2.4-2(2) of the Rules** means the following parts relevant to the accuracy of testing machines:

(1) Tensile testing machines and compression testing machines
   (a) Rams, cylinders, loading screw rods, loading levers and fulcra, crossheads and their spherical seats, etc., for a loading device.
   (b) Scale plates, a force indicator inter-locking mechanism, measuring rams and cylinders, shock-absorbers, pendulum and weights for measurements, levers and fulcra for measurements, a force detecting device of the electric force measuring mechanism, measuring circuits for detecting outputs the from force detecting device (amplifiers, automatic balancing circuits), indicators, and recording devices, etc., for a force indicating device.

(2) Impact testing machines
   Pendulums (including hammers, striking edges, bearings), test piece supports and anvils, pendulum dropping devices (including stopping devices and release mechanisms), pointers and angular scale plates, etc. of indicating mechanisms.

(3) Hardness testing machines
   (a) Loading weights, loading levers and fulcra, rams and cylinders, oil pressure gauges, anvil elevating screws, etc. for Brinell hardness testing machines.
   (b) Loading weights, loading levers and fulcra, indenter mounting shafts, indenters, hardness indicators, anvil elevating screws, etc. for Rockwell hardness testing machines.
   (c) Loading weights, loading levers and fulcra, indenter mounting shafts, indenters, measuring microscopes, anvil elevating screws, etc. for Vickers hardness testing machines.
   (d) Machine frameworks, hammers, hardness indicators or indicator scales, etc., for Shore hardness testing machines.

~~(4) Force proving instruments~~
   ~~Indicators and their fittings~~

1.3.5 Markings

Sub-paragraph -4 has been amended as follows.

4 "Particulars as deemed appropriate by the Society" specified in **1.3.5-2 of the Rules** are to be as follows:

~~(1) Force proving instruments~~
   ~~(a) Maximum capacity~~
   ~~(b) Manufacture's name~~

~~(c) Date of Manufacture~~
~~(d) ID. No.~~
~~(e) Date of calibration~~

~~(2) Reference test pieces for testing machines~~

(~~a~~1) Reference energy value and standard deviation of the set
(~~b~~2) Symbol or number indicating the ~~lot~~ batch division
(~~c~~3) Number in the ~~lot~~ batch

Chapter 3 CHARPY PENDULUM IMPACT TESTING MACHINES

3.4 Initial Inspection

3.4.2 Inspection of Function

Sub-paragraph -2 has been amended as follows.

2 The expression "it is to be verified that the performance of each structural component of the testing machine is satisfactory to test normally" referred to in **3.4.2-1 of the Rules** means to verify the following items:

(1) Release of the pendulum from the pendulum dropping device.
(2) No side vibration, etc. during the swing of the pendulum.
(3) No excessive vibrations or displacements of the machine framework, pendulum and anvil at the moment when the hammer strikes the test piece.
(4) Smoothness of the load pointer and the leaving pointer of the indicating device at the moment when the hammer strikes the test piece. Further, the adequacy of the inertial and frictional resistance of the leaving pointer.
(5) Any looseness likely to have been created at important connecting parts of the testing machine assembly after the striking of the pendulum.
(6) The construction used to prevent rebounding of the broken test pieces back to the pendulum, e.g. a sufficient allowance in space on the sides of the ~~test piece support and~~ anvil.
(7) No changes in the pendulum, tip of edge, and corners of ~~test piece support and~~ anvil, etc. after the striking of the hammer.
(8) Any abnormalities in the installed conditions of the testing machine after the striking of the hammer.
(9) Any abnormalities in the deformations of the test piece struck by the hammer

Chapter 5 has been deleted.

Chapter 5 ~~FORCE PROVING INSTRUMENTS USED FOR THE VERIFICATION OF UNIAXIAL TEST MACHINES~~(Deleted)

~~**5.3 Initial Inspection and Renewal Inspection**~~

~~**5.3.1 General**~~

~~The following verifications are to be carried out in accordance with *ISO* 376 in order to verify "effectiveness of the device and construction" specified in **5.3.1-2 of the Rules**: The aforementioned standard, in principle, refers to the most recent version published.~~

~~(1) Verification relating to application of forces~~

~~(2) Verification for resolution of indicator~~

~~(3) Verification of minimum force~~

~~**5.3.2 Inspection of Function**~~

~~**1** "Overloading test" specified in **5.3.2-1 of the Rules** may be substituted by a manufacturer's test carried out prior to the delivery or service.~~

~~**2** The wording "the procedures deemed appropriate by the Society" specified in **5.3.2-2 of the Rules** means the procedures specified in *ISO* 376. And the force-proving instruments is to comply with the provisions for "class 1" of this standard. The aforementioned standard, in principle, refers to the most recent version published.~~

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 30 June 2022.
2. Notwithstanding the amendments to the Guidance, the current requirements apply to the testing machines and force proving instruments for which the application for survey is submitted to the Society before the effective date.