g. Mating standoff—The initial mating standoff of reference master gauges and working gauges shall be marked on the ring gauge only. Mating standoff values determined by periodic retest as specified in 12.10 shall not be marked on reference master or working gauges.

Following are examples:

A certified regional master or a reference master NC56 rotary gauge shall be marked as follows:

A B Co (or mark) NC56 Rotary
Registration Number
Date of Certification
Mating Standoff

An NC56 working gauge shall be marked as follows:

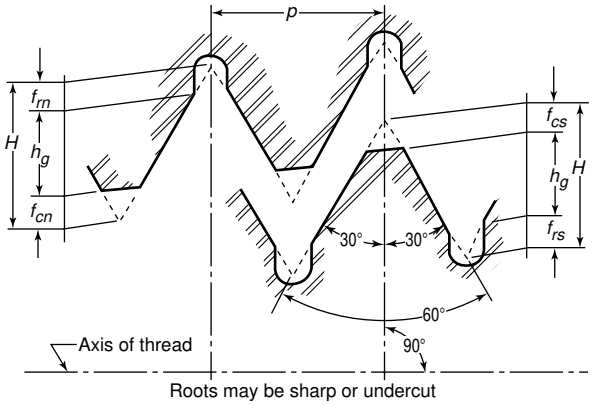
A B Co (or mark) NC56 Rotary Spec 7
Mating Standoff

A certified regional master or a certified reference master $4^1/_2$ REG rotary gauge shall be marked as follows:

A B Co (or mark) $4^1/_2$ REG Rotary
Registration Number
Date of Certification
Mating Standoff

A certified regional master or a certified reference master NC38 rotary gauge shall be marked as follows:

A B Co (or mark) NC38 Rotary
Registration Number
Date of Certification
Mating Standoff



Note: See Tables 28, 29, 30, and 31.

Figure 26—Gauge Thread Form

Table 28—Gauge Thread Dimensions Rotary Shouldered Connections

1	2	3	4	5	6	7	8	9	10
Form of Thread	Number of Threads Per Inch (Reference)	Pitch p	Taper Inches Per Foot on Diameter	Reference Thread Height, Not Truncated H	Thread Height, Truncated h_g	Root Truncation Maximum f_{rs}	Root Truncation Maximum f_{rn}	Crest Truncation f_{cs}	Crest Truncation f_{cn}
V-0.038R	4	0.2500	2	0.216005	0.101459[a]	0.053385	0.053385	0.061161	0.061161
V-0.038R	4	0.2500	3	0.215379	0.100996[a]	0.053385	0.053385	0.060998	0.060998
V-0.040	5	0.2000	3	0.172303	0.093383	0.039460	0.039460	0.039460	0.039460
V-0.050	4	0.2500	3	0.215379	0.119219	0.048080	0.048080	0.048080	0.048080
V-0.050	4	0.2500	2	0.216005	0.119605	0.048200	0.048200	0.048200	0.048200
V-0.055	6	0.166667	1.5	0.144200	0.089000	Not applicable (sharp)		0.055100	0.055100

Notes:

1.In computing thread height and truncation, account has been taken of the effect of taper in reducing thread height for a given pitch, as compared with values for the same pitch on a cylinder.
2. See Tables 29, 30, and 31 for tolerances on columns 3, 4, 6, 9, and 10.
3. See Figure 26.
4. All dimensions in inches at 68°F. See Appendix M for metric table.
[a]The h_g dimiension for V-0.038 R thread form (Column 6) cannot be used to compute major and minor diameters from the pitch diameters given in Tables 28 and 29 because the crest and root transactions are not equal.

Table 29—Tolerances On Reference Master Gauge Dimensions

Plug Gauge		Ring Gauge	
Element	Tolerance	Element	Tolerance
Pitch diameter at gauge point[a]:		Minor diameter at gauge point	± 0.002
Sizes 6 5/8 and NC50 and smaller	± 0.0004	Lead[b]:	
Sizes 7 5/8 and NC56 and larger	± 0.0005	Sizes 1 through 5 1/2 and NC23 through NC50	± 0.0006
Major diameter at gauge point	± 0.002	Sizes 6 5/8 and NC56 and larger	± 0.0007
Diameter of fitting plate	± 0.015	Taper[c,d]:	
Lead[b]:		L_{rg} 3 1/2 and shorter	– 0.0004 – 0.0012
Sizes 6 5/8 and NC50 and smaller	± 0.0004	L_{rg} 3 5/8 through 4	– 0.0004 – 0.0014
Sizes 7 5/8 and NC56 and larger	± 0.0005	L_{rg} 4 1/8 through 4 1/2	– 0.0004 – 0.0016
Taper[c]:		L_{rg} 4 5/8 through 5	– 0.0004 – 0.0018
L_{rg} 3 1/2 and shorter	+ 0.0004 – 0.0000	L_{rg} 5 1/8 through 5 1/2	– 0.0004 – 0.0020
L_{rg} 3 5/8 through 4	+ 0.0005 – 0.0000	L_{rg} 5 5/8 through 6	– 0.0004 – 0.0022
L_{rg} 4 1/8 through 4 1/2	+ 0.0006 – 0.0000	Half angle of thread	± 15 min
L_{rg} 4 5/8 through 5	+ 0.0007 – 0.0000	Length L_{rg}	± 3/32
L_{rg} 5 1/8 through 5 1/2	+ 0.0008 – 0.0000	Crest truncation:	
L_{rg} 5 5/8 through 6	+ 0.0009 – 0.0000	Sizes 6 5/8 and NC 50 and smaller	± 0.00120
Half angle of thread	± 7 min	Sizes 7 5/8 and NC 56 and larger	± 0.00125
Length L_{pg}	± 3/32	Outside diameter D_R	± 1/64
Crest truncation:		Diameter of counterbore Q	± 0.015
Sizes 6 5/8 and NC 50 and smaller	± 0.00120	Mating standoff S	± 0.001
Sizes 7 5/8 and NC 56 and larger	± 0.00125		

Notes:
1. See Figure 24.
2. All dimensions in inches at 68°F, ± 2°F. See Appendix M for metric table.
[a]Helix angle correction shall be disregarded in pitch diameter determinations.
[b]Maximum allowable error in lead between any two threads whether adjacent or separated by any amount not exceeding the full length of thread less one full thread at each end.
[c]L_{rg} values are listed in Table 27, Column 11.
[d]The pitch cone of the ring gauge is provided with a minus taper in order to minimize variations in interchange standoff due to lead errors.

Table 30—Tolerances On Grand and Regional Master Gauge Dimensions

Plug Gauge		Ring Gauge	
Element	Tolerance	Element	Tolerance
Pitch diameter at gauge point[a]	± 0.0002	Minor diameter at gauge point	± 0.002
Lead[b]:		Lead[b]:	
Sizes 3 1/2 and smaller	± 0.0002	Sizes 3 1/2 and smaller	± 0.0003
Sizes 4 to 8 5/8, inclusive	± 0.0003	Sizes 4 to 8 5/8, inclusive	± 0.0004
Taper[c]	+ 0.0004	Taper[c,d]	– 0.0006
	+ 0.0001		– 0.0012
Half angle of thread (minutes)	± 5	Half angle of thread (minutes)	± 10
Length L_{pg}	± 3/32	Length L_{rg}	± 3/32
Crest truncation	± 0.00112	Crest truncation	± 0.0011
		Outside Diameter D_R	± 1/64
		Diameter of counterbore Q	± 0.015
		Mating standoff S	± 0.001

Notes:
1. See Figure 24.
2. All dimensions in inches at 68°F, ± 2°F. See Appendix M for metric table.
[a]Helix angle correction shall be disregarded in pitch diameter determinations.
[b]Maximum allowable error in lead between any two threads whether adjacent or separated by any amount not exceeding the full length of thread less one full thread at each end.
[c]L_{rg} values are listed in Table 27, Column 11.
[d]The pitch cone of the ring gauge is provided with a minus taper in order to minimize variations in interchange standoff due to lead errors.

Table 31—Tolerance On Working Gauge Dimensions

Plug Gauge		Ring Gauge	
Element	Tolerance	Element	Tolerance
Pitch diameter at gauge point[a]:		Minor diameter at gauge point	± 0.002
Sizes $6\frac{5}{8}$ and NC50 and smaller	± 0.0004	Lead[b]:	
Sizes $7\frac{5}{8}$ and NC56 and larger	± 0.0005	Sizes 1 through $5\frac{1}{2}$ and NC23 through NC50	± 0.0006
Major diameter at gauge point	± 0.002	Sizes $6\frac{5}{8}$ and NC56 and larger	± 0.0007
Diameter of fitting plate	± 0.015	Taper[c,d]:	
Lead[b]:		L_{rg} $3\frac{1}{2}$ and shorter	– 0.0004 – 0.0014
Sizes $6\frac{5}{8}$ and NC50 and smaller	± 0.0004	L_{rg} $3\frac{5}{8}$ through 4	– 0.0004 – 0.0016
Sizes $7\frac{5}{8}$ and NC56 and larger	± 0.0005	L_{rg} $4\frac{1}{8}$ through $4\frac{1}{2}$	– 0.0004 – 0.0018
Taper[c]:		L_{rg} $4\frac{5}{8}$ through 5	– 0.0004 – 0.0020
L_{rg} $3\frac{1}{2}$ and shorter	+ 0.0006 – 0.0000	L_{rg} $5\frac{1}{8}$ through $5\frac{1}{2}$	– 0.0004 – 0.0022
L_{rg} $3\frac{5}{8}$ through 4	+ 0.0007 – 0.0000	L_{rg} $5\frac{5}{8}$ through 6	– 0.0004 – 0.0024
L_{rg} $4\frac{1}{8}$ through $4\frac{1}{2}$	+ 0.0008 – 0.0000	Half angle of thread	± 15 min
L_{rg} $4\frac{5}{8}$ through 5	+ 0.0009 – 0.0000	Length L_{rg}	± $\frac{3}{32}$
L_{rg} $5\frac{1}{8}$ through $5\frac{1}{2}$	+ 0.0010 – 0.0000	Crest truncation:	
L_{rg} $5\frac{5}{8}$ through 6	+ 0.0011 – 0.0000	Sizes $6\frac{5}{8}$ and NC 50 and smaller	± 0.00120
Half angle of thread	± 7 min	Sizes $7\frac{5}{8}$ and NC 56 and larger	± 0.00125
Length L_{pg}	± $\frac{3}{32}$	Outside diameter D_R	± $\frac{1}{64}$
Crest truncation:		Diameter of counterbore Q	± 0.015
Sizes $6\frac{5}{8}$ and NC 50 and smaller	± 0.00120	Mating standoff S	± 0.001
Sizes $7\frac{5}{8}$ and NC 56 and larger	± 0.00125		

Notes:
1. See Figure 25.
2. All dimensions in inches at 68°F, ± 2°F. See Appendix M for metric table.
[a]Helix angle correction shall be disregarded in pitch diameter determinations.
[b]Maximum allowable error in lead between any two threads whether adjacent or separated by any amount not exceeding the full length of thread less one full thread at each end.
[c]L_{rg} values are listed in Table 27, Column 11.
[d]The pitch cone of the ring gauge is provided with a minus taper in order to minimize variations in interchange standoff due to lead errors.

13 Gauge Certification, Rotary Shouldered Connections

13.1 CERTIFICATION AGENCIES

New and reconditioned regional master and reference master gauges shall be submitted for certification as to the accuracy of all essential elements as required in 12.1 and 12.2. The National Institute of Standards and Technology shall be the certifying agency for all regional master gauges.

New and reconditioned reference master gauges shall be submitted to one of the following agencies for certification:

a. National Institute of Standards and Technology, Gaithersburg, Maryland, U.S.A.
b. National Physical Laboratory, Teddington, England.
c. National Research Laboratory of Metrology, Ibaraki, Japan.
d. National Measurement Laboratory, Lindfield, N.S.W., Australia.
e. Instituto Nacional de Tecnologia Industrial, Buenos Aires, Argentina.
f. National Institute of Metrology, Beijing, People's Republic of China.

Note: Application to become an API Gauge Certification Agency is open to any metrology laboratory capable of demonstrating compliance with API policy and specified requirements. Interested parties shall notify the API Upstream Segment at 1220 L Street, NW, Washington, D.C. 20005. Appendix E of this specification outlines certification agency requirements.

13.2 GENERAL REQUIREMENTS

Regional master and reference master gauges shall be certified in complete sets, e.g., a reference master plug and a reference master ring. A single gauge may be certified only if accompanied by a previously certified mating gauge. When a previously certified mating gauge is used, the certificate of certification shall be furnished to the certifying agency as proof of the accuracy of the mating gauge.

All gauges submitted for certification shall be permanently marked with its API registration number at the time of submittal.

13.3 CERTIFICATION

For each set of gauges that complies with all requirements, the gauge manufacturer shall obtain a certificate from the certifying agency as evidence of the gauge accuracy. The certificate shall contain the following information:

a. Name of certifying agency.
b. Signature of inspector.
c. Date of certification.
d. API registration number of each gauge.
e. Mating standoff measurement.
f. Interchange standoff measurement.
g. Statement of compliance to 13.7.
h. Statement of compliance to Section 12.

13.4 INTERCHANGE STANDOFF

All new and reconditioned reference master gauges shall be submitted to one of the agencies referenced in 13.5 or 13.6 for determination of interchange standoff against grand or regional master gauges, as required in 12.8.

13.5 GRAND MASTER GAUGES

One grand master gauge in each size and style of connection is deposited with the National Institute of Standards and Technology, Gaithersburg, Maryland. These grand master gauges are used to check the interchange standoff of both regional master gauges and reference master gauges. Only regional master and reference master gauges manufactured by an API licensed gauge manufacturer shall be checked with the grand master gauges.

Note: Grand and regional master gauges shall not be used to inspect used working gauges.

13.6 REGIONAL MASTER GAUGES

Appendix F lists the agencies that have on deposit, in available sizes and styles, regional master gauges. These regional master gauges are used to check the interchange standoff of reference master gauges. Only reference master gauges manufactured by an API licensed gauge manufacturer shall be checked with the regional master gauges.

Note: Grand and regional master gauges shall not be used to inspect used working gauges.

13.7 DETERMINATION OF STANDOFF

Mating and interchange standoff (see Figures 23 and 24) shall be determined as follows:

a. During the test all pieces entering into the measurement shall be at a uniform temperature of 68°F, ± 2°F (20°C, ± 1.1°C).
b. Gauges shall be free of visible evidence of contaminates before mating. A thin film of medicinal mineral oil shall be wiped on the threads with clean chamois skin or bristle brush.
c. The pair shall be mated hand tight without spinning into place, and complete register shall be accomplished with the torque hammer specified for each size (see Figure 27).
d. The number of torque hammer blows is unimportant. Sufficient number should be made so that continued hammering will not move the ring relative to the plug. When testing, the plug gauge should be rigidly held, preferably in a vise mounted on a rigid work bench. When so held, 12 torque hammer blows should be sufficient to make complete register.

Table of Weights

1-lb. (0.454 kg) weight for gauges in sizes 1 and 1/2.

2-lb. (0.908 kg) weight for gauges in sizes 2 3/8 and 2 7/8 and NC23, NC26, and NC31.

3-lb. (1.362 kg) weight for gauges in sizes 3 1/2 and 4 and NC35, NC38, NC40, NC44, NC46, and NC50.

and NC56 and NC61.

5-lb. (2.270 kg) weight for gauges in size 7 5/8 and NC70.

6-lb. (2.724 kg) weight for gauges in size 8 5/8 and NC77.

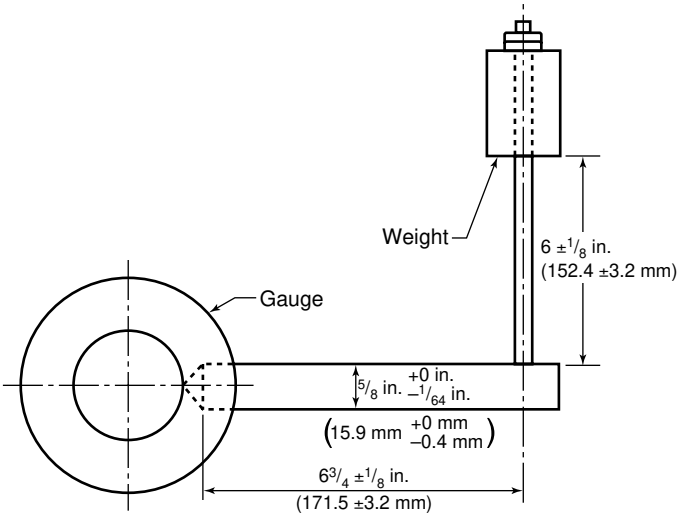


Figure 27—Torque Hammer

13.8 STANDOFF REPORT

If the gauge conforms to the interchange standoff limits specified in 12.8 or 12.10, the gauge manufacturer or reconditioner shall obtain, from the certifying agency, a report showing both the mating and interchange standoff values.

13.9 MARKING

All sets of regional or reference master gauges found to be in full conformance with the requirements of Section 12 shall have the plug gauge only permanently marked with the name or identification mark of the certifying agency.

14 Connection Marking

When used on products or applications not covered by this specification, any rotary connection that conforms to the threading and gauging stipulations given herein may, at the manufacturer's option, be identified by stamping or stenciling the product adjacent to such thread with the manufacturer's name or mark, "Spec 7," and the size and style of connection. The connection marking may be applied to products that are not covered by API specifications. For example, an NC46 connection may be marked:

A B Co (or mark) SPEC 7 NC46 THD

15 Inspection and Rejection

When stated on the purchase order, the provisions of Appendix N shall apply.

APPENDIX A—SUPPLEMENTARY REQUIREMENTS

A.1 General

By agreement between the purchaser and the manufacturer and when specified on the purchase order, the following supplementary requirements shall apply.

A.2 Kelly Valves and Other Drill Stem Safety Valves

A.2.1 GAS TIGHT SEALING SUPPLEMENTAL REQUIREMENT

Kelly valves and other drill stem safety valves have not historically been designed with gas tight sealing mechanisms. Valves that are designed to operate under these conditions are known as gas tight valves. See A.2.2 for optional performance verification testing that may be requested as a supplemental requirement by purchaser to verify gas tight sealing design and for routine acceptance testing for each gas tight valve supplied.

A.2.2 GAS TIGHT SEALING PERFORMANCE VERIFICATION TESTING

Supplemental performance verification testing of kelly valves and other drill-stem safety valves designed and built to this specification shall be carried out and/or certified by a quality organization independent of the design function. Since high pressure leak testing is potentially more hazardous with gas than with low compressibility fluids, high pressure gas testing shall be restricted to performance verification testing. Nitrogen or other suitable non-flammable gas should be used at ambient temperature conditions. Otherwise, low and high pressure testing shall be conducted as per 4.5.2. No gas bubbles shall be seen in the 5-minute test period.

For each valve manufactured to the same specifications as a valve that has been designed and verified as being capable of gas tight sealing, a low pressure gas test to 90 psi, using ambient temperature air, shall be performed using appropriate parts of 4.5.2. No gas bubbles shall be seen in the 5-minute test period.

A.2.3 H_2S TRIM SUPPLEMENTAL REQUIREMENT

When valve trim materials conform to the requirements of NACE MR-01-75 for H_2S service, at conditions specified by the manufacturer, then the valve shall be designated "H_2S Trim". H_2S Trim may be requested as a supplemental requirement by purchaser.

WARNING: H_2S Trim valves shall not be considered safe for use in a sour environment, as defined in NACE MR-01-75, since the material used in the body of H_2S Trim valves is not suitable for sour service.

A.2.4 SUPPLEMENTAL MARKING REQUIREMENTS

Supplemental performance verification testing information shall be applied in a separate milled recess. Designations shall be used to indicate verified performance as follows:

Successful Gas Tight Sealing Supplemental Testing:	"Gas Tight"
H_2S Trim Supplemental Requirement:	"H_2S Trim"

A.3 Tool Joint/Drill Pipe Weld Zone

A.3.1 SR1—FREQUENCY OF TESTING

One set of mechanical tests shall be conducted per lot or 200 welds, whichever is less.

A.3.2 SR2—CHARPY V-NOTCH TYPE A IMPACT TESTS

The test temperature shall be – 4°F ± 5°F (– 20°C, ± 2.8°C).

A.3.3 SR3—MINIMUM VALUES

The minimum average value for the three specimens shall not be less than 20 ft-lbs. The minimum value for any single specimen shall not be less than 17 ft-lbs.

APPENDIX B—INSTRUCTIONS FOR CARE AND USE OF API REGIONAL MASTER GAUGES

B.1 The gauging surfaces of regional master gauges should be protected with a coating of petrolatum brushed into the threads. In cold weather it is advisable to heat the petrolatum slightly so that it will flow easily. If gauges are not used for a period of six months, the gauges should be thoroughly cleaned and a fresh coating of petrolatum applied. (A neutral oil is effective in protecting gauges for only a short period of time, a few days to two weeks depending on atmospheric conditions. In warm weather an oil will flow off the surface much faster than in cold weather. Eventually dust particles settling on an oil-protected gauge will penetrate the gauge surface and cause small rust spots. Since the custodian may not know when the regional masters will be used again upon completing the check of standoff of a set of reference master gauges against the regional masters, the use of petrolatum as protection is advised in all cases.)

B.2 Gauges should be stored unassembled in a well controlled temperature environment. When gauges are stored with plug and ring assembled with or without a protective coating, there is a tendency for electrolytic corrosion to develop, appearing as a discoloration of the surfaces in contact. If left assembled for a long period, the surfaces may actually rust together. The ideal storage arrangement for regional master gauges is a case or cupboard with wood shelves provided with a door with lock and key to prevent unauthorized use of the gauges. Shelves should be partitioned with wood spacers to provide a separate compartment for each size plug gauge. This prevents damage to thread surfaces in storing. Compartments for rings are not required, but rings should not be stacked. Shelving should be covered with waxed paper to protect end surfaces of plugs and rings.

B.3 In the determination of standoff values, both regional master and reference master gauges should be thoroughly cleaned before assembly. This can be done most efficiently by immersing the gauges (plug or ring) in a suitable solvent and brushing the thread surfaces with a stiff brush. After cleaning, the reference gauges should be inspected for damaged threads, rust, etc. Gauges with burns or rough threads that may damage the regional master gauges should not be assembled with those gauges. With regard to discoloration on the thread surfaces, the custodian must use his judgment. The coefficient of friction between smooth and bright steel surfaces is less than between rough and discolored surfaces. It is apparent that the friction factor enters into the determination of standoff values. A gummy oil deposit on the gauge seriously adds to the friction. It is inadvisable to determine standoff on gauges with such a deposit.

B.4 For standoff determination the thread surfaces of the gauges should be completely, but lightly, covered with medicinal mineral oil. Excess oil should be avoided since the excess would have to flow out of the ends of the gauge and if trapped may affect the standoff value.

B.5 In the assembling operation, the plug gauge should be held rigidly in a vise. The vise should be of a heavy type and firmly fastened to a rigid bench. This is of importance as standoff values, especially on the larger sizes, may be affected by the rigidity of the holding device. In using the hammer, the lever arm should be approximately horizontal (see Figure 27). Standoff should be measured at four points around the fitting plates, avoiding contact with any raised points caused by the stamping of serial numbers on the plates. The mean of the four readings should be taken as the standoff value to be reported.

APPENDIX C—INSTRUCTIONS FOR SHIPMENT OF REFERENCE MASTER GAUGES

C.1 Reference master gauges should ordinarily remain in good condition for years if properly cared for and used only for the purpose intended, namely, the checking of working gauges with smooth, clean threads. If the gauges become dirty, they should be cleaned by the gauge owner before shipment to the custodian for standoff determinations.

C.2 Oily deposits or discolorations may sometimes be removed with a pointed, soft wood stick. To do this, the gauge (plug or ring) should be chucked in a lathe and rotated slowly while the stick is pressed into the thread with equal bearing on both flanks. A large portion of such deposits can usually be removed by this method, but it may sometimes be necessary to charge the stick with oil and a fine grade of emery. A coarse or quick cutting abrasive should not be used.

Note: A fine grade of emery flour, such as No. 12 Washington Mills, is recommended for this purpose.

C.3 Burrs or small scored places on the threads may be stoned with a fine grade of stone. The stoning of scored places extending all the way around the gauge is not approved as the accuracy of the gauges may be seriously affected by extensive stoning. For severe cases of pitting or scoring, regrinding by the gauge maker is advisable.

C.4 After reconditioning, the gauge must be cleaned thoroughly.

C.5 After drying, the plug and ring gauge should be thoroughly covered with medicinal mineral oil, assembled in mating pairs, then wrapped in oil paper.

C.6 Each mating pair of gauges should be boxed separately for shipment, using waste or similar packing.

C.7 Shipping boxes should be securely made and the material should be heavy enough to prevent damage to the gauges during shipment; 2-inch (50.8-millimeter) material is recommended. If gauges are received by the custodian in boxes inadequate for return shipment, the custodian will repair or replace the shipping containers, and add cost to the inspection fee. The gauges should be held rigidly in place in the box by a follower block with a hole through the middle that fits the handle of the plug gauge snugly. This follower block should be fastened with wood screws through the outside of the box.

C.8 The tops of the shipping boxes should be screwed on, not nailed, with the return address affixed securely on the reverse side, so that the top can be reversed by the custodian for return shipment to the owner.

C.9 All carriage charges must be prepaid. Shipment to custodians should preferably be by express, which is faster in transit and delivery. When returning gauges, custodians will ship collect. Owners should indicate to the custodian whether gauges are to be returned by freight or express.

C.10 Custodians are not permitted to assemble grand or regional master gauges with reference master gauges that have dirty or damaged threads. If cleaning is required, other than that required to remove the protective coating, the testing agency will charge for the extra work. If the gauge is rusted or scored to the extent as to require reconditioning, the gauge owner will be so notified. Failure to recondition such gauges will be considered justification for cancellation of the gauges' status as authorized reference master gauges.

C.11 Owners of gauges that are to be transported by ship from outside the United States to the National Institute of Standards and Technology (NIST) for test must make prior arrangements with a customs broker either in the country of origin or in the United States for entry of the gauges into the United States, with or without bond as may be necessary, and prepaid transportation to and from the ports of entry and exit. Entry in bond is required for gauges made outside the United States, whereas gauges made in the United States may be entered without bond. If arrangements are made with a broker in the country of origin, that broker should, in turn, have a customs broker in or near the port of entry arrange for entry of the gauges and prepaid transportation to the National Institute of Standards and Technology, Gaithersburg, MD.

C.12 An alternative method of shipment that eliminates the need for services of a customs broker is by air freight to NIST via Dulles International Airport, Washington D.C. When shipments are made by this method, NIST will pick up the gauges at the airport, arrange for entry in bond when necessary, and after test obtain release from bond if required and deliver the gauges to the airport for return shipment. The gauges will be returned collect with transportation charges payable at destination.

C.13 Transportation by air is much more expensive than by ship but the difference is largely offset by customs broker's charges. An added advantage of air transportation is the very great decrease in the time the gauges are away from the owner's factory.

C.14 The agencies' charges for tests will be billed separately from those of a customs broker. Prepayment of all charges for tests is required.