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Proposed AWI Standard

for

Millwork & Wood Trim

THIS IS A DRAFT FOR REVIEW BY A CONSENSUS BODY AND NOT AN APPROVED STANDARD. NO PART OF THESE MATERIALS MAY BE DISTRIBUTED OR USED FOR AWI STANDARDS COMPLIANCE

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1.0 Purpose

a) Provide standards and tolerances for the quality and fit of catalog and made-to-order millwork, shop-fabricated assemblies, and related interior and exterior finishes (henceforth referred to as “Product”).

b) Establish minimum aesthetic and performance standards intended to provide a well-defined degree of control over a project’s quality of materials and workmanship for Product.

2.0 Scope

a) Provides aesthetic and structural performance standards for catalog and made-to-order mouldings and shop-fabricated assemblies.

- Catalog mouldings are typically produced in stock dimensions listed in manufacturer/supplier's catalog.
- Made-to-order mouldings are designed for a specific project.
- Shop-fabricated assemblies may include catalog and/or made-to-order mouldings and other components.

2.1 Included

a) Product as specified within the following sections per CSI's MasterFormat:

- 06 20 00 Finish Carpentry
  - 06 20 13 Exterior Finish Carpentry
  - 06 20 23 Interior Finish Carpentry
- 06 22 00 Millwork
  - 06 22 13 Standard Pattern Wood Trim
- 06 40 00 Architectural Woodwork
  - 06 40 13 Exterior Architectural Woodwork
  - 06 40 23 Interior Architectural Woodwork
- 06 46 00 Wood Trim

2.2 Not Included

a) Installation of Product.

b) Structural components, grounds, in-wall blocking, backing, furring, brackets, or other anchorage that becomes an integral part of the building's walls, floors, or ceilings are not furnished or installed under the scope of this standard's requirements.

c) Machining for hardware supplied by others.

d) Product as specified within the following sections per CSI's MasterFormat:

- 06 42 00 Wood Paneling
- 06 43 00 Wood Stair, Handrail, & Guard Systems
- 06 48 00 Wood Frames.

3.0 Requirements

3.1 General

a) The following requirements shall govern unless a project's contract documents require otherwise.

b) Should a conflict be discovered within this standard, the least restrictive requirement shall prevail.

c) Manufacturer/supplier shall provide drawings in accordance with AWI 100 - Submittals (latest edition).

d) When applicable, manufacturer/supplier shall verify field measurements.

e) Unless otherwise indicated, requirements apply equally to all aesthetic grades.

f) Any term used herein that is defined by the AWI Glossary uses only that definition for conformance to this standard.

g) When multiple options for wood species and/or trim profiles are permitted, selection shall be at the option of the manufacturer/supplier.

3.1.1 Measurements

a) This standard is written with the International System of Units (SI) followed by the United States customary system of measurement in brackets.

b) The system of measurement used in the project's original contract documents and architectural drawings shall dictate which system of measurement within these standards is used for verification of compliance.

c) The United States customary measurement is typically a "soft" conversion of the SI measurement. In order to make the SI number more conceptually coherent and consistent, most conversions for less than 152.4 mm [6"] in dimension are "soft" converted to the nearest 0.1 mm. For measurements above 152.4 mm [6"], the "soft" value is converted to the nearest 1 mm.

d) "Inconspicuous," when used in this standard, means not readily visible without careful inspection at a distance of:

Premium	Custom	Economy
610 mm [24"]	1219 mm [48"]	1829 mm [72"]

e) Gaps and flushness between components shall be tested with a feeler gauge at points where components are required to contact as indicated within this standard.

3.1.2 Special Requirements

a) When seismic construction is required, such requirements and details shall be specified in the contract documents.

b) Requirements such as moisture resistant or fire-retardant materials, shall be specified in the contract documents.

3.1.3 Environmental Conditions

a) Requirements of this standard are contingent upon maintaining proper interior environmental controls prior to, during, and after installation. See AWI 200 – Care and Storage (latest edition).

b) Dimensional and warp requirements, flushness and gap tolerances of this standard are contingent upon maintaining proper interior environmental controls prior to, during, and after installation.

~~c) Product intended for non-climate controlled environments: Upon jobsite delivery, dimensional and warp requirements, flushness and gap tolerances shall meet the requirements herein.~~

~~d) Product intended for non-climate controlled environments: This standard does not establish grade requirements for dimensional and warp requirements, flushness and gap tolerances.~~

e) This standard does not establish grade requirements for dimensional, warp, flushness, and gap tolerances of Product intended for non-climate controlled environments.

f) At time of jobsite delivery, dimensional, warp, flushness, and gap tolerances shall meet the requirements established herein. Post-delivery, such requirements no longer apply for Product intended for non-climate controlled environments.

3.1.4 Manufacturer/Supplier Requirements for Installation

a) Installation of Product shall be in accordance with ANSI/AWI 0620 - Finish Carpentry/Installation (latest edition).

b) Manufacturer/supplier shall provide drawings indicating required location of blocking. See AWI 100 - Submittals (latest edition).

3.1.5 Default Performance Requirements

a) Product shall comply with the following minimum defaults:

- Custom Grade
- Unfinished closed-grain hardwood intended for an opaque finish

3.2 Material

a) Materials used for the construction of Product covered within the scope of this standard shall adhere to the requirements set forth in AWI 300 - Materials (latest edition).

b) Materials used for the same purpose, within the scope of this standard, shall be consistent throughout a project.

c) Moulding shall be manufactured in industry recognized species lengths appropriate for the scope of work.

d) Delamination or separation is not permitted.

e) For interior applications, Type II water resistant adhesive is required.

f) Contact adhesive is not permitted.

g) Product within 152.4 mm [6”] of contact with the finished floor shall be solid wood, or particleboard or fiberboard with a 24-hour thickness swell factor of 5.5% or less, in accordance with ASTM D1037 (latest edition) or veneer core substrate with Type II adhesive.

h) Glass used in conjunction with Product shall be in accordance with ANSI Z97.1 (latest edition).

3.2.1 Non-Climate Controlled Applications

a) For exterior applications, Type I fully waterproof adhesive is required.

b) Panel products shall be APA rated exterior grade.

c) Fasteners shall be corrosion-resistant.

d) Exterior trim shall be furnished as material only, Product required to be assembled shall be specified.

e) Finish technology shall be specified.

3.2.2 Catalog Moulding

3.2.2.1 Transparent Finish

a) Solid wood shall be:

Premium	Custom	Economy
Plain-sawn	Plain-sawn	Sawn at the option of the manufacturer/supplier

b) Wood veneer faced trim shall be permitted.

c) Finger-jointed solid wood trim shall be:

Premium	Custom	Economy
Not permitted	Not permitted	Permitted

3.2.2.2 Opaque Finish

a) Finger-jointed solid wood trim shall be:

Premium	Custom	Economy
Not permitted	Permitted	Permitted

3.2.3 Made-to-Order Moulding

3.2.3.1 Transparent Finish

a) Finger-jointed solid wood trim shall be:

Premium	Custom	Economy
Not permitted	Not permitted	Permitted

b) Solid wood and/or veneer shall be:

Premium	Custom	Economy
Of one species for the entire project	Of one species for the entire project	No species requirement

c) Solid wood shall be:

Premium	Custom	Economy
Plain sawn	Plain sawn	Sawn at the option of the manufacturer/supplier

d) Veneer grade shall be:

Premium	Custom	Economy
ANSI/HPVA HP-1 (latest edition) Grade A	ANSI/HPVA HP-1 (latest edition) Grade A	At the option of the manufacturer/supplier

e) Veneer slicing shall be:

Premium	Custom	Economy
Plain sliced	Plain sliced	At the option of the manufacturer/supplier

3.2.3.2 Opaque Finish

a) Solid wood shall be closed-grain hardwood.

b) Finger-jointed solid wood trim shall be:

Premium	Custom	Economy
Not permitted	Permitted	Permitted

c) Panel type shall be:

Premium	Custom	Economy
MDF or closed-grain hardwood veneer ANSI/HPVA HP-1 (latest edition) minimum Grade B on MDF or particleboard core	MDF or closed-grain hardwood veneer ANSI/HPVA HP-1 (latest edition) minimum Grade C on MDF or particleboard core	MDF or closed-grain hardwood veneer ANSI/HPVA HP-1 (latest edition) minimum Grade D on MDF or particleboard core

3.2.3.3 Solid Wood

a) Trim over 50.8 mm [2”] wide applied flat to wall surfaces and at doors and windows, shall have reverse side:

Premium	Custom	Economy
Backed out	Backed out	Backed out at the option of the manufacturer/ supplier

3.2.3.4 Veneer

a) Veneer faced panels and/or moulding profiles shall have cores of solid wood, laminated wood, MDF, or other suitable material.

3.2.3.5 Decorative Laminate

a) Core material shall be particleboard or MDF.

b) HPDL or TFL of specified color or pattern.

c) HPDL or TFL shall meet a Resistance to Impact by Large Diameter Ball (ISO 4586-2-2018(E): Test 25) from a distance of 600 mm [23.622”].

3.2.4 Closet and Utility Shelving

a) Shall be a minimum of 19.1 mm [.750”] thick. Shelves with unsupported length exceeding 914 mm [36”] shall be a minimum of 25.4 mm [1”] thick or shall have an applied front drop edge a minimum of 19.1 mm [.750”] x 50.8 mm [2”].

b) Wood shelf rods shall be a minimum of 33.0 mm [1.300”] in diameter.

c) Ends and back cleats shall be a minimum of 19.1 mm [.750”] thick by 88.9 mm [3.500”] wide when receiving clothes rod or hooks.

d) Ends and back cleats shall be a minimum of 19.1 mm [.750”] thick by 38.1 mm [1.500”] wide when not receiving clothes rod or hooks.

3.3 Structural

a) Construction methods and materials shall be consistent throughout the project.

b) Panels shall have adequate space to move, float, expand, and/or contract as a result of temperature and/or relative humidity.

c) Built-up components shall be fabricated with half lapped, mitered, miter fold, shoulder mitered, tongued, or equivalent joinery methods.

d) Cutouts and/or other related alterations shall maintain the structural integrity of Product.

e) Inside corners shall be furnished oversized for field fitting and installation.

3.3.1 Shop-Fabricated Assembly Joints

a) Shall be securely attached.

b) Shall be glued and mechanically fastened.

c) Shall fit tight and flush.

d) Joints exceeding 101.6mm [4”] in width shall be:

Premium	Custom	Economy
Biscuit spline, butterfly, scarf, or dowel	Clamp nail, biscuit spline, butterfly, scarf, or dowel	At the option of the manufacturer/supplier

e) At stile and rail assemblies shall be built up in units as large as practical and:

Premium	Custom	Economy
Components shall be mortised and tenoned, doweled, or splined	Components shall be mortised and tenoned, doweled, or splined	Pocket screw or biscuit spline joinery

3.3.1.1 Trim Components and Assemblies

a) Applied mouldings shall be spot-glued and mechanically fastened.

3.3.2 Radius Components and Assemblies

a) Assemblies shall be fabricated from components in the longest practical length.

b) Factory assembled in sections as large as practical for field installation.

c) Radius woodwork assemblies require construction of solid machined, block laminate plies, veneer core or kerfed solid wood (See Figure 160).

d) Solid machined and block laminated components shall be divided to minimize the exposure of cross grain in the face of the member.

e) Angle of grain at the face of the curved member shall not exceed 30 degrees, unless a small part size requires otherwise (See Figure 161).

f) Dado joinery shall completely house the male member throughout the entire length of joint.

g) Chord segmentation is not permitted (See Figure 162).

3.3.2.1 Transparent Finish

a) Radius frames shall be constructed of:

Premium	Custom	Economy
Laminated plies or veneer faced block cores	Laminated plies or veneer faced block cores	At the option of the manufacturer/supplier

b) When laminated, resawn solid wood shall be reassembled in the same order and orientation as sawn:

Premium	Custom	Economy
Required	Required	At the option of the manufacturer/supplier

c) Joinery at straight legs to radius members shall be:

Premium	Custom	Economy
Spline or half-lap, glued and mechanically fastened	Spline or half-lap, glued and mechanically fastened	At the option of the manufacturer/supplier

d) Block lamination at segmented materials shall be:

Premium	Custom	Economy
Cut from same board when practical	Cut from same board when practical	At the option of the manufacturer/supplier

e) Block lamination at segmented joints shall be staggered.

f) Block lamination shall have similar grain angle at adjacent segment ends.

3.3.3 Decorative Laminate

a) Inside corners of cut outs shall have a minimum 6.4 mm [.250”] radius.

3.4 Aesthetic

a) Aesthetic performance, in relation to this standard, refers to and is an evaluation of surfaces exposed following installation.

b) The three levels of aesthetic grades are Premium, Custom, and Economy:

Premium Grade	Custom Grade	Economy Grade
The aesthetic grade defining the highest degree of control over materials, workmanship, and manufacture.	The aesthetic grade defining a high degree of control over materials, workmanship, and manufacture.	The aesthetic grade defining the minimum degree of control over materials, workmanship, and manufacture.

c) Cores shall not be exposed.

d) At opaque finish, natural characteristics and manufacturing defects are permitted, provided the surface is filled solid and inconspicuous.

e) Voids, wane, and unfilled knots are permitted when concealed after installation.

f) Fastener holes in pre-finished Product shall be filled with matching joint filler (putty).

g) Exposed fasteners are not permitted, except at access panels.

h) Fasteners, at exposed surfaces, shall be kept to a minimum, countersunk, filled, and compatible for color. Wherever possible, penetrate through quirks and/or reliefs.

i) Repairs shall be inconspicuous.

j) For interior applications, surfaces requiring factory finish shall be in accordance with ANSI/AWI 0400 Factory Finishing (latest edition).

3.4.1 Exposed Surfaces, Transparent Finish

a) Adjacent surfaces shall be:

Premium	Custom	Economy
Well-matched for color and grain	Compatible for color and grain	Compatible for color and grain

b) Exposed trim component ends shall be:

Premium	Custom	Economy
Miter returned	Profiled or miter returned	At the option of the manufacturer/supplier

3.4.2 Radius Assemblies, Transparent Finish

a) Adhesives shall be compatible for color to laminated material.

3.4.3 Closet and Utility Shelving

a) Unassembled shelves, dividers, and cleats shall be furnished cut to width in lengths suitable for installer fitting.

b) Maximum gap at either end of shelf and wall shall not exceed 6.4 mm [.250”].

c) Ends of shelves specified as more than 6.4 mm [.250”] away from the wall shall be an exposed edge.

d) Closet rods shall be supported a minimum of 1219 mm [48”] on center.

e) Utility standards and brackets shall meet manufacturer/supplier spacing requirements.

3.4.4 Edges

3.4.4.1 Transparent Finish

a) When not solid wood, visible edges shall be edgebanded with solid wood, veneer, or veneer tape a minimum of .5 mm [.018”] thick and:

Premium	Custom	Economy
Same species as panel face and well-matched for color and grain	Same species as panel face and compatible for color and grain	Same or compatible species at the option of the manufacturer/supplier

b) Edgebanding shall be applied before or after the face material.

c) Finger joints in veneer tape used as edgebanding are permitted.

d) Solid wood when applied as an exposed edge, finger joints are:

Premium	Custom	Economy
Not permitted	Permitted at one per 2438 mm [96”] of edge length	Permitted

3.4.4.2 Opaque Finish

a) Visible edges shall be filled and sanded MDF; or edgebanded with paintable PVC, paintable ABS, closed-grain hardwood veneer, or closed-grain solid wood.

b) Edgebanding shall be applied before or after the face material.

c) Finger joints in veneer tape used as edgebanding are permitted.

d) Solid wood when applied as an exposed edge, finger joints are:

Premium	Custom	Economy
Not permitted	Permitted at one per 2438 mm [96”] of edge length	Permitted

3.4.4.3 Decorative Laminate

a) Visible edges shall be edgebanded or MDF core painted compatible to exposed face, to preclude show-through of core.

b) Edgebanding shall be applied before or after the face material.

c) Edges shall be HPDL, PVC, or ABS a minimum of .5 mm [.018”] thick and a maximum of 3 mm [.118”] at the option of the manufacturer/supplier.

d) PVC and ABS edgebanding thicker than 1 mm [.039”] shall be radiused or beveled on edges and corners.

e) PVC and ABS shall be compatible with the exposed face.

f) HPDL edgebanding shall match exposed surfaces.

3.4.4.4 Closet and Utility Shelving

a) Exposed edges of panel product shelves, dividers, and cleats shall match exposed face; edgebanded or prepped for opaque finish, edgebanded with paintable PVC, paintable ABS, or filled.

b) Adjoining adjustable shelf ends shall match exposed face; edgebanded or prepped for opaque finish, edgebanded with paintable PVC, paintable ABS, or filled.

c) When miter folded, exposed edges shall have no open gaps and be filled or sanded.

3.4.5 Tolerances

3.4.5.1 Machining, Exposed

a) Machining rules for exposed surfaces shall comply with smoothness requirements.

b) Sharp edges shall be eased.

c) Flat wood surfaces require a minimum of:

Premium	Custom	Economy
150 grit sanding	120 grit sanding	15 KMPI or 100 grit sanding

d) Profiled and shaped wood surfaces require a minimum of:

Premium	Custom	Economy
120 grit sanding	20 KMPI or 120 grit sanding	15 KMPI or 100 grit sanding

e) Turned wood surfaces require a minimum of:

Premium	Custom	Economy
180 grit sanding	120 grit sanding	15 KMPI or 100 grit sanding

f) Visible sanding marks, excluding turned surfaces, shall be inconspicuous.

g) Tear out, nicks, and/or hit and miss machining is not permitted when visible after installation.

h) Glue or joint filler (putty), when used, shall be inconspicuous and match the adjacent surface for smoothness.

3.4.5.2 Joints

a) Shall be assembled to meet the tolerances defined within this standard and be securely attached, with any adhesive residue removed from exposed surfaces.

b) Gaps at factory joints not exceeding the widths indicated shall be permitted if filled with compatible for color material.

c) Gaps at miter or butt joinery shall not exceed:

Premium	Custom	Economy
.3 mm [.012”] by 20% of the joint length	.4 mm [.016”] by 20% of the joint length	.6 mm [.025”] by 20% of the joint length

d) Gaps at parallel surface joints shall not exceed:

Premium	Custom	Economy
.3 mm x 101.6 mm [.012” x 4”] and shall not occur within 1829 mm [72”] of a similar gap in the same joint	.4 mm x 152.4 mm [.016” x 6”] and shall not occur within 1524 mm [60”] of a similar gap in the same joint	.6 mm x 229 mm [.025” x 9”] and shall not occur within 1219 mm [48”] of a similar gap in the same joint

e) Gaps at exposed surface edge joints shall not exceed:

Premium	Custom	Economy
.3 mm [.012”]	.4 mm [.016”]	.6 mm [.025”]

3.4.5.3 Flushness Variations

a) Wood to wood at miter or butt joinery shall not exceed:

Premium	Custom	Economy
.1 mm [.004”]	.2 mm [.008”]	.3 mm [.012”]

b) Wood to non-wood at miter or butt joinery shall not exceed:

Premium	Custom	Economy
.3 mm [.012”]	.4 mm [.016”]	.6 mm [.025”]

c) Non-wood to non-wood at miter or butt joinery shall not exceed:

Premium	Custom	Economy
.3 mm [.012”]	.4 mm [.016”]	.6 mm [.025”]

3.4.5.4 Warp

a) As a lineal ratio, per 305 mm [12”] in the diagonal, width, and/or length, warp of Product (See Figure 5, E) shall not exceed:

Premium	Custom	Economy
.8 mm [.031”]	1.2 mm [.047”]	1.6 mm [.063”]

(Measurements for warp shall be taken on the concave face of the panel.)

4.0 Figures / Illustrations

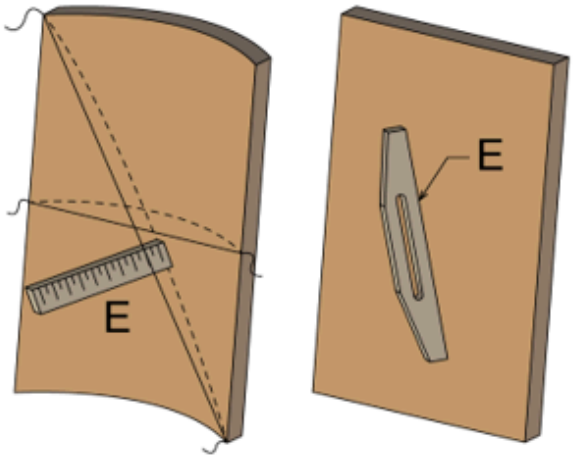

Figure 5 - Compliance Testing Measurement

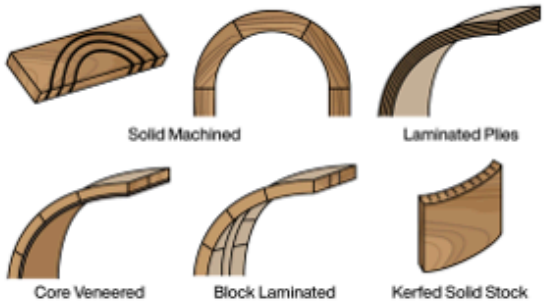

Figure 160 - Radius Woodwork Assemblies

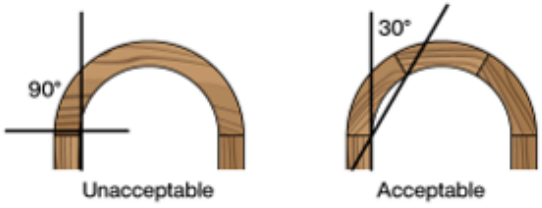

Figure 161 - Grain Angle

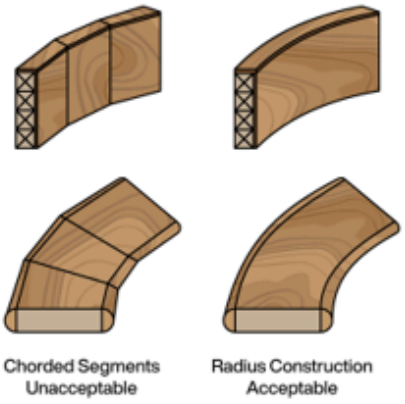

Figure 162 - Chord Segmentation

5.0 Supplemental

5.1 Glossary

a) The Architectural Woodwork Institute Glossary can be found at: https://www.awinet.org/standards/glossary

5.2 Design Professional Responsibilities

a) Specify “AWI Standards” in each applicable specification section.

b) Examine product technical data sheets to determine if material performance (e.g. scratch and wear resistance) is appropriate for the project.

5.2.1 Contract Document Requirements

a) Accessories, cut outs, and locations

b) Hardware placement, manufacturer, product model numbers, product finish color and/or other related accessories

c) Grain or pattern direction

d) Chemical resistant finish or surfaces

e) Flame spread rating

f) Moisture resistance

g) Seismic fabrication and/or installation

h) Insulation from adjacent heating and cooling sources

i) Interior clearance

j) Illustrate/identify specific trim and/or moulding profiles required

k) Overall Product finished thickness

l) Color requirements for opaque finish

m) AWI Finishing System Number or Finishing Technology

n) Staining requirements for transparent finishes

o) Glass type, thickness, edge treatment and glazing requirements

p) Unique panel surface patterns on elevation illustrations

q) Specific installation hardware and/or related assembly mounting systems, including design, engineering, specifications and drawings for assembly suspension.

5.2.2 Wood Specifications

a) Species

b) Grain direction

5.2.2.1 Solid Wood

a) Cut (plain, quartered, rift)

5.2.2.2 Veneer

a) Method of slicing (plain, quartered, rift, or rotary)

b) Core type

c) Veneer matching requirements

d) Veneer figure and other unique visual characteristics is not a function of a veneer species and/or its grade. If required, Design Professional/Specifier shall identify such veneer figure and visual characteristics in the contract documents.

e) If the Design Professional has pre-selected/identified specific veneer(s) for project, then the project specifications are to identify the veneer supplier and the flitch number(s).

5.2.3 Decorative Laminate

a) Pattern and color

b) Pattern direction

c) Core type

d) Material grade

e) Laminate finish

5.3 Surface Categories

5.3.1 Exposed

a) Surfaces normally visible after installation

5.3.2 Concealed

a) Surfaces not normally visible after installation

5.4 References

a) AWI 100 - Submittals (latest edition)

b) AWI 200 - Care & Storage (latest edition)

c) AWI 300 - Materials (latest edition)

d) ANSI/AWI 0400 - Factory Finishing (latest edition)

e) ANSI/AWI 0620 - Finish Carpentry/Installation (latest edition)

f) ISO 4586 (latest edition)

g) ANSI/HPVA HP-1 (latest edition)

h) ANSI Z97.1 (latest edition)