



CRO/CRR Commercial Roof Anchors Instruction/Specification Manual 2019

ENGLISH
VERSION

!WARNING TO USER!

You are required to read and use the Instruction/ Specification manual supplied at the time this device was shipped. Improper use and installation can result in serious injury or death. Follow inspection requirements before each use.

Material Specifications

Risers and base plates:

Imported: Q235 Steel/304sst.

Domestic: A36 Steel, 304sst, 316sst.

Finish: ASTM 123 Hot dip galvanized (HDG).

2.0" i.d. Loop Tops: Min. Tensile strength 10,000lb.
No. 1093=Q345 imported cast steel.

No. 1093S=316 imported cast sst.

Low Temperature: -30°F to +130°F.

Compliance

CRO anchors are 3rd party certified to comply with ANSI Z359.18 Type A/T Intertek Lab Report 2019 OSHA 1926:502/1910.140(13).

IWCA 1-14.1 window washing / CAL-OSHA title 8

⊗=Inspection Points from pg.3.

Specified Use

Fall Arrest, Work Positioning, Window Washing, and Horizontal Lifeline system (end and intermediate anchor points).

Davits: When engineered by a qualified person*, CRO's may be used for suspended platforms and material lifting equipment. Specifications are not included in this manual. *OSHA Definition.

Strength Rating

Min. Tensile Strength: 5,000lb(22.5kN).

No permanent deformation in any direction the load is applied to the top fixture.

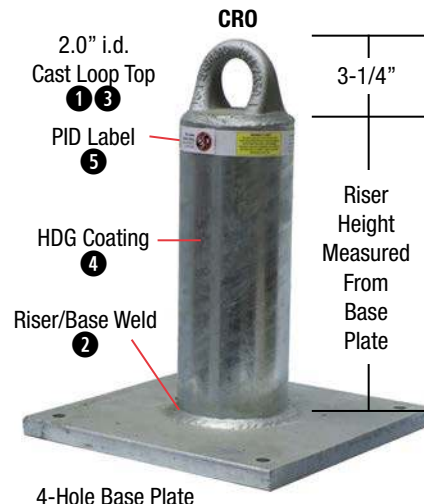
Ultimate Strength Rating: 7,500lb.

Proof Loading: Do not exceed 2,500lb(11kN).

4-1 Design Load: 1,250lb(567kg).

WARNING! This manual does not address engineering of the supporting structure to which the anchor is attached to.

Fig.1



Engineering/Testing

3rd Party: The specifications in this manual are based on SAS 3rd party engineering.

Testing and written reports are available upon request.

Project Engineering: Architects, engineers or qualified person* may provide their own installation specifications that vary from those shown in this manual.

Custom mfg. CRO's may be custom mfg. upon request.

*OSHA Definition.

Supporting Structural Members/Substrates

CRO are engineered for bolt-thru attachment to wood, steel or concrete, cast-in-place (CIP) concrete, post-installed concrete (wedge bolt) and field welded to steel supporting structures as shown at Fig.7. CRR risers are engineered for field welding to supporting structures as shown at Fig.8. The anchor attachment point must be structurally capable of supporting 5,000lb or 2x the intended fall protection load per OSHA 1910.140(13). CAL-OSHA may require the supporting structure to withstand a min. of 5,000lb. without any permanent deformation.

Structural Engineering: Supporting structures, H-Beams and substrates to which anchors are attached must be specified by the project architect or engineer. 3rd party structural engineering is available from SAS upon request.

Anchor Locations: Are determined by the fall protection system design for use as a single anchor point (PPE), Horizontal Line (HLL) or window washing. Typically anchor locations are specified by the project architect, engineer or may be specified by the SAS Plan Service.

Fall Protection User Specifications

CRO/CRR anchors are designed to support a suspended component/tie-back line for an active fall protection system and comply with ANSI Z359.18 type A and T anchorage connectors for use by a single worker with a maximum user wt. of 340lb including tools and equipment. Maximum free fall exposure of 6ft(1.8m) when used as a fall arrest anchor.

User PPE: Workers are required to wear a full body harness (FBH), a personal energy absorber and other fall protection components that comply with current OSHA/ANSI or CSA standards.

Note: Consult PPE instruction manuals for user instructions.

Attachment Bolts

Attachment bolts are required to be 1/2" diam. or larger diameter grade 8,18-8 sst or type A307 threaded rod. Bolt threads must extend past the bolt nut a min. of 1/8" as shown at Fig.3.

Bolt-Attached Installation w/Backer Plate

Attach anchors over supporting steel or wood beam members as shown at Fig.2, with SAS supplied backer plates sized the same as the anchor base plate with corresponding bolt holes. Backer plates are supplied raw or with HDG coating. Standard size 12x12 base and backer plates shown at Fig. 6.

Foam Filling

CRO's mfg. after 11-2019 have polyurethane foam-filled riser cavities. CRO's supplied prior to 10-2019 and field welded risers may be foam filled on site by following the instructions at Fig.11.

Fig.2

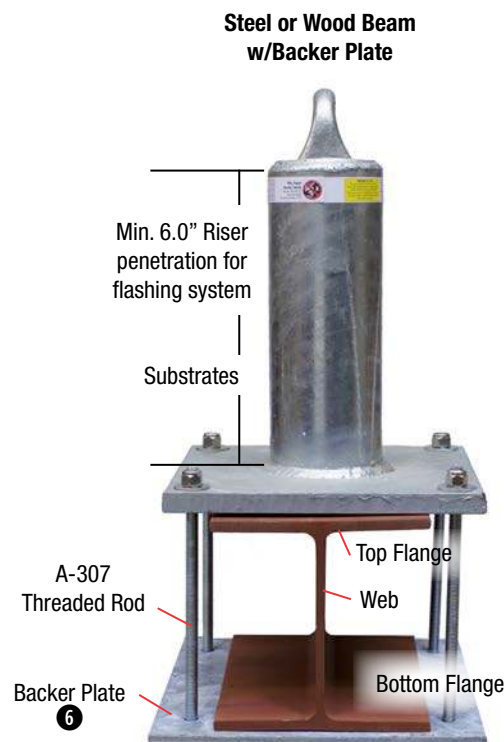
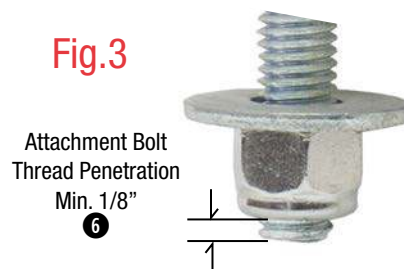


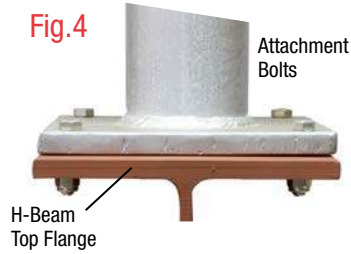
Fig.3



Direct Bolt-Attached Installation

Use bolt lengths that provide adequate thread penetration as shown at Fig.3. Lock nuts required.

Fig.4



Base and Backer Plate Specifications

Standard size 12x12 base/backer plates are mfg. with the same dimensions. Custom sizes are available by request.

12x12" Standard 8-Hole Base Plate

4-hole base plates supplied with corner bolt holes only.

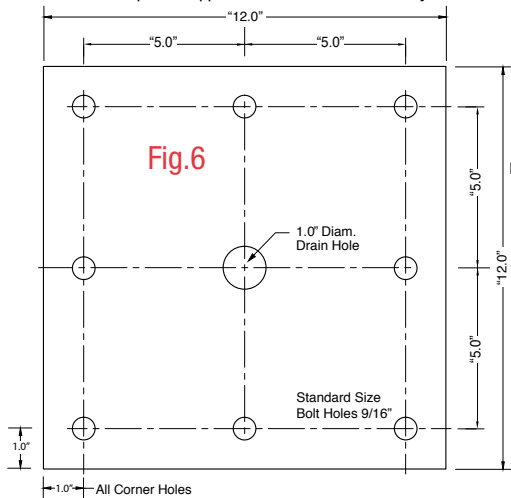
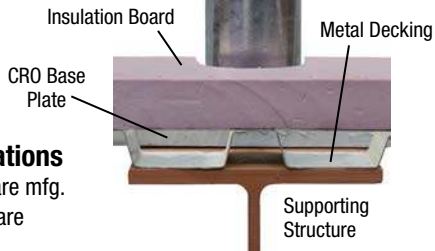


Fig.5a

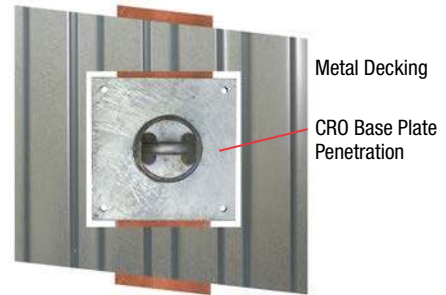
Calculate Riser Height 6-8" above substrate for flashing.



Metal Decking/Insulation Board

Anchors installed directly onto supporting members require a penetration through the metal decking for the anchor base plate as shown at Figs.5a-5b. Cut bolt hole cavities for insulation board and wood substrates that install directly over the base plate. To prevent deflection when service or proof loads are applied, it is not recommended to install anchors over the top of metal decking unless specified by the project architect or engineer.

Fig.5b



Field-Welded Base Plates

Position anchor base plate over the center of an H-Beam/steel plate as shown at Figs.7c, Fig.8. Weld sides "A" and "B" as shown at Figs.7a-7b with weld lengths specified in Table 2.0. Optional welding specifications may be specified by the project architect or engineer. Coat welds with zinc spray paint.

CRO Web Stiffeners: To prevent beam twisting under a service load or free fall, web stiffeners may be required as specified by the project architect or engineer.

CRR Web Stiffeners: Web stiffeners specifications are shown in Table 3.0.

Fig.7a

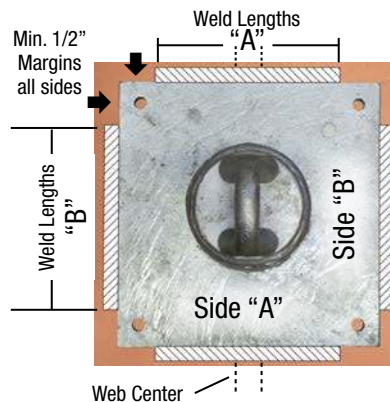


Fig.7b

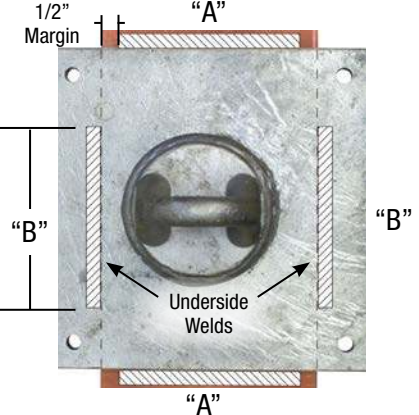


Table 1.0 Material and Dimension Specifications

Riser Ht.	Description		Loop Top	Dimensions		Approx. wt/lb
	Name	No.		Wall O.D.	Δ Base Plate	
8	CRO-8	1400-G	1093	0.337 4.5"	12x12x 5/8"	38
		1400-S	1093-S			
12	CRO-12	1401-G	1093	0.337 4.5"	12x12x3/4"	49
		1401-S	1093-S			
18	CRO-18	1402-G	1093	0.337 4.5"	12x12x1.0"	66
		1402-S	1093-S			
24	CRO-24	1403G	1093	0.337 4.5"	12x12x1-1/8"	79
		1403-S	1093-S			
30	CRO-30	1404-G	1093	0.674 4.5"	12x12x1-1/4"	137
		1403-S	1093-S			
36	CRO-36	1405-G	1093	0.674 4.5"	12x12x1-3/8"	158
		1405-S	1093-S			

G=Hot Dip Galvanized (HDG) S=304sst. 1093-S=316sst loop top.

CRR Field-Welded Risers

CRR risers have the same wall thicknesses and loop tops as CRO anchors. See Table 1.0. Center riser over the top flange as shown at Fig.8. Weld per. Table 3.0.

Table 3.0 CRR Risers

Anchor Model	Weld Depth (W)	Top Flange Dim. Web Stiffeners	
		No	Yes
CRR-8		1/2"	3/8"
CRR-12	3/8"	11/16"	7/16"
CRR-18			1/2"
CRR-24	1/2"	3/4"	9/16"
CRR-30	3/4"	7/8"	5/8"
CRR-36		1.0"	11/16"

Fig.7c

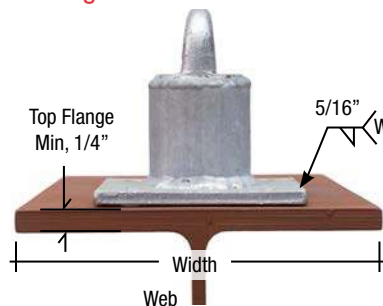


Fig.8

See Table 3.0

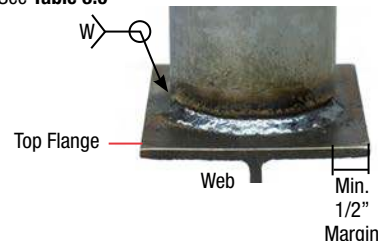


Table 2.0 CRO Base Plate Weld Specifications

Anchor Model/Ht	Base Sq. (")	Welds A/B	Margins	H-Beam/Plate Specifications
CRO-8 8.0"	8 10 12 16			
CRO-12 12.0"	8 10 12 16	5"/5" Total 20.0"		
CRO-18 18.0"	8 10 12 16		Min. 1/2" A/B Sides	*Min. 1/4" Top Flange Thickness
CRO-24 24.0"	10 12 16	5"/6" Total 22.0"		*Min. 6.0" Top Flange Width
CRO-30 30.0"	10 12 16	5"/7" Total 24.0"		
CRO-36 36.0"	10 12 16	5"/8" Total 26.0"		

Proof Loading**WARNING!** Maximum proof load: 2,500lb

Fig.8a

Loop Top Service Load
Direction "A" Parallel to Riser

Fig.8b

Loop Top Service Load
Direction "B" Perpendicular to Riser

Apply proof load force only in the direction of the service load

Training/Inspections/Maintenance

The safety Program Administrator* or trainer must ensure that each worker using this equipment has read and understood these instructions and has their own personal copy. **Inspections:** Initial installation, prior to each use, and annual inspections are required to be performed by a qualified person**.

Field Welding: Must be performed by a certified welder and documented.

Documentation: Shall include the following: Part description, inspection date, inspectors name and inspection results. A copy of all inspections should be maintained by the program administrator or responsible person.

Safety Program: This manual is intended to be used as a guideline only. Building owners are required to maintain their own safety program.

***Program Administrator Definition: ANSI Z359.0-2012 (2.127)**

"A person authorized by their employer to be responsible for managing the employer's fall protection program."

****OSHA 1910.140 Definition:** Possession of a recognized degree, certificate, or professional standing, has extensive knowledge, training, and experience and has demonstrated the ability to solve problems related to the devices specified in this manual.

Inspection Points

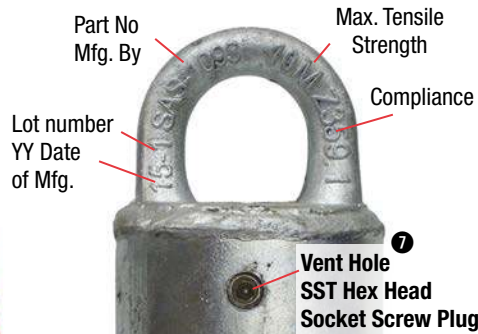
☒ Require to tag DO NOT USE. ☑ Repair. Do not remove from service.

- 1 Loop Top to riser weld cracks. ☒ See Fig.1
- 2 Cracks in riser to base plate weld prior to installation or when subjected to:
 - Free fall of more than 6ft.
 - Contacted by a heavy object or equipment.
 See Free Fall section.
- 3 Deformation of riser or loop top. ☒
- 4 Rust present. ☑ Clean and apply cold zinc coating.
- 5 PID label missing or not readable. ☑ Request replacement label.
- 6 Min.4 attachment bolts and lock nuts securely tightened as shown at Fig.3. Threaded rod requires lock nuts on each end. Flat washers are optional.
- 7 Vent hole plug missing. Fig.5 ☑ Request replacement plug. Option: Fill hole with silicone caulking.

Fig.10

SST Vent Hole Plug/Stamp Marks
1093/1093-S Loop Top Stamp Marks

Fig.9

DO NOT USE Tagging

Riser vent holes are required to vent welding gases and are sealed and plugged after galvanizing. Missing vent plugs can be the source of water penetration.

Proof Loading

Shown at Figs. 8a-8b, apply a maximum force of 2,500lb in the direction of the service load only. It is recommended to use a connector that is rated for a min. of 5,000lb tensile strength. If deflection is noted, determine if the supporting structure at the attachment point is flexing by releasing the proof load force. The riser should return to its static position.

Failed Proof Load: From the underside, determine if the supporting structure or attachment bolts are damaged. If the riser base plate weld is not visible, removal of the roofing membrane/substrates may be required to determine the cause of the failed proof load. Anchors that fail to pass inspection or proof loading must be removed from service. See Fig.9 for tagging.

Proof Loading/IWCA Specifications

Direction of Force	* Frequency		Proof Load/Inspection	
	Inspect	Re-cert.	Fail	Pass
Direction of service load "A" or "B" See Figs.8	Annually by a "Qualified Person"	10 years **By a certified test agency	Tag anchor DO NOT USE See Fig.9	Document Inspection

*ANSI/IWCA 1.14.1 article 9.19

**Under the supervision of a registered professional engineer, article 9.1.10

Free Fall or Contact with Materials or Equipment

- *Subjected to a free fall of 6ft or less: 1 2 3

The following conditions require the supporting structure, attachment bolts and riser to base plate weld to be inspected by a qualified person. Proof loading may be performed to determine if structural damage has occurred.

- Contacted by heavy equipment or materials hoisting or a free fall of more than 6ft.
- Obvious deformation of the riser or loop top. 1 2 3

*CRO anchors are structurally capable of withstanding a 6ft free fall without deformation or structural damage to the anchor itself. Roofing flashing/membranes should be inspected for damage.

Removal From Service Procedure

When an anchor fails to pass inspection, the inspector must notify the safety program administrator immediately and tag the anchor "DO NOT USE" in a way that will be obvious to workers.

See Fig.9 example. Anchors removed from service should be disposed of in a way that prevents further use.

Replacement Anchors: Prior to replacement, an inspection of the supporting structure should be made by a professional structural engineer to determine if the same anchor location can be used. Do not reinstall anchors onto supporting structures that are damaged.

Foam Filling CRR Risers

WARNING! Due to the heat generated from field welding and ventilation requirements, foam must be added after welding. Use a commercial grade aerosol applied polyurethane foam. Insert the foam filler into the riser vent hole as shown at Fig.9. Allow foam to expand and remove excess. Apply thread sealant to the vent plug and install flush with the riser surface. Remove excess thread sealant.

Fig.11



Field Welding CRR Risers and CRO Base Plates



Fig. 12a

CRR-CRO: Grind off approx. 1.0" of the HDG from the **CRR** riser base. **CRO** remove HDG along base plate edge where welding is performed. See **Figs. 7a-7b**. Remove any coating or rust from the supporting structure weld surface.

CRR Risers: Remove the vent Hole plug to allow welding gas to escape from the riser cavity.

Concrete Installations:

Concrete PSI: 2,500lb min. sufficiently cured to support the fall protection load.

Table 4.0 specifies typical installation requirements for concrete installations.

See **Table 4.1** for attachment bolt specifications. The project architect or engineer may provide optional installation specifications.

Cast-In-Place/Bolt-Thru: Use correctly sized hex head bolts or threaded rod as shown at **Figs. 13.1-13.2** w/lock nuts and flat washers. 3/8" Backer plates with same bolt hole pattern as anchor base plate may be used for additional strength but are not required. See **Fig. 13.3**.

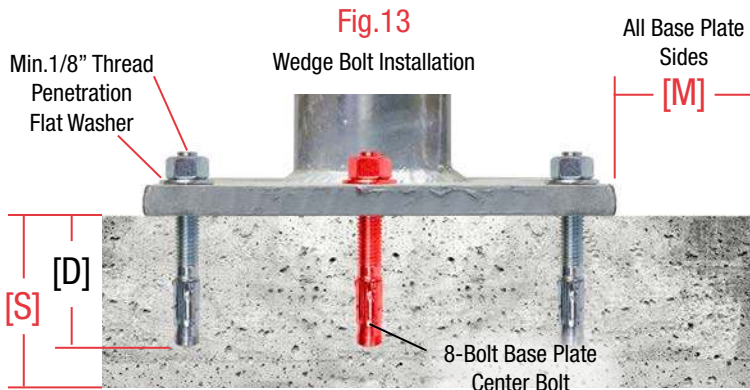


Table 4.1 Attachment Bolts

Installation Type	*Bolt Type	Diameter
Wedge	Hilti KB-TZ	Consult bolt mfg. specifications. 1/2" min.
Epoxy	Simpson Set-3G	
Cast-In-Place Bolt-Thru	Heavy Hex Bolt Grade 8/18-8sst/A307 rod	

*Or as specified by project architect/engineer

1093 Loop Top HLL Components

- 1058-1058-S Jaw-Jaw Turnbuckle
- 1059 Metallic Energy Absorber
- 1086S Coupler to attach wire rope eye thimbles.

Consult SAS Horizontal Lifeline Manuals for complete system specifications.

PID Labels

Product I.D. (PID) labels specify the anchor materials, compliance standards and user specifications.

Label shown w/o/warning. See page 1 Warning Box.

Commercial Roof Anchor
Min. Breaking Strength: MBS 5,000lb no deformation with load applied to loop top in any direction. 4/1 working load.
Specified Use: Fall protection for one person w/max user wt. of 340lb. PPE anchor point, Window Washing, Horizontal Lifeline Systems.

Installation: Bolt, field weld, or concrete embedment to an engineered attachment point. Field welding performed by a certified welder per SAS specifications.
Warning! Max. proof load 2,500lb (11kN)
Compliance: OSHA 1910.140(13) ANSI/IWCA 1-14.1-2001 ANSI Z359.18 Type A/T CAL-OSHA Title 8 sec. 3291(f) 2.0" i.d. Loop Top Fixture. Service Temp: -30°F / +130°F

CRR: Weld the entire riser base to the supporting structure as specified in **Table 3.0**.

CRO: See **Table 2**.

Min. 5/16" fillet weld or greater if specified by the project architect or engineer.

Foam Filling CRR Risers

If specified by installer apply foam filling after welding. See **Fig. 11**.

Protecting The Weld

Coat all welds and bare metal with cold zinc spray.

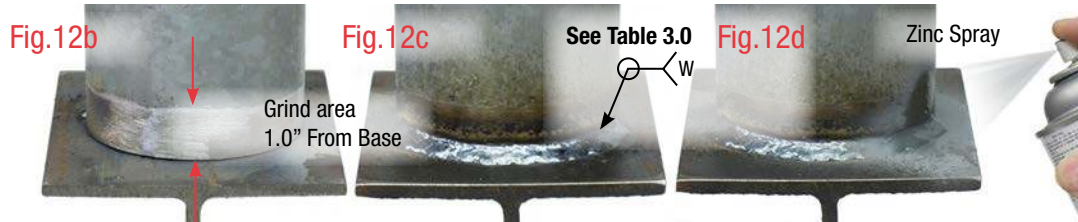


Table 4.0 CRO Concrete Embedment Specifications/(in)

Anchor Model/Ht.	Base Plate	Min. Embedment/Slab Depth/Margins				Bolt - Thru
		4-Bolt[D]	Slab[S][M]	8-Bolt[D]	Slab[S][M]	
CRO-8 8.0"	8x8 10x10 12x12 16x16	2.625	4.0	N/A		Min. 3.5" Concrete Depth
CRO-12 12.0"	8x8 10x10 12x12 16x16	3.75	5.625	N/A		
CRO-18 18.0"	8x8 10x10 12x12 16x16	5.50	8.25	3.50	5.25	
CRO-24 24.0"	10x10 12x12 16x16	6.875	10.31	4.50	6.75	
CRO-30 30.0"	10x10 12x12 16x16	N/A		5.50	8.25	
CRO-36 36.0"	10x10 12x12 16x16	N/A		6.50	9.75	

Min. Slab [S] and Margin [M] dimension from all base plate sides.

[M]/[S]=1.5 x embedment depth [D].

Fig. 13.1
Cast-In-Place (CIP)Fig. 13.2
Bolt-ThruFig. 13.3
Bolt-Thru w/Backer

Label Example:

Model	CRO-12	Material:	A-36 Steel
Part No.	1401-G	Riser: Sch.	Sch 80 Loop Top 1093
DOM	11-2019	Base Plate:	12x12x3/4
Serial No.	6 Digit	Finish:	HDG Ht. 12.0"