Cranston Specification:	**CS005**
UNIHOOK™ Models:	All
Issued: 211210	Patent Pending

Guidelines for cargo lifting with Cranston Machinery UNIHOOKS™

www.cranston-machinery.com

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WARNING- All owners, users and technicians should review this Cranston Specification CS005 prior to operation or servicing of a UNIHOOK™.

ATTENTION- Cranston UNIHOOK™ Bulletins, for the current models, provide model specific details including step-by-step assembly and lubrication instructions, exploded view parts drawings and part lists. Bulletins are shipped with new hooks and available on the Cranston website

ATTENTION- Rigging requirements, conditions of use, and maintenance of cargo handling gear is outside of Cranston Machinery Control. To determine the safe application of the Cranston Machinery UNIHOOK™, the user must evaluate each application under the condition of use and the safety factor pertinent to the appropriate industry.

NOTE- In addition to the UNIHOOK™ products, Cranston Machinery designs and manufactures:

- 5 and 10MT SWL Pneumatic release WEBLATCH™ hooks, for working with wide webs,
- UNILIFT™ 2MT SWL manually operated hooks.
- "Custom Lift Beams" and "Pneumatic Release Kits" complete with controls and all hook components. See Cranston's website for Links to our "Lifting Products" presentation and details on individual model upgrades.

Section 1. Introduction and History

Cranston Machinery Co. UNIHOOK™ have been developed to enable the user to easily engage the hook to the lifting sling (manually latched) and once the cargo has been moved, to provide powered remote release (pneumatic supply activated manually or thru electronic solenoids). The designs, material specifications, manufacturing methods, functional components, and hook shapes have been continually studied, tested, improved, and customized, since their introduction in 1972. Cranston's cargo handling products, over 100 models, are currently in operation over the global landscape.

Cranston Machinery Co. hooks are generally designed for tandem (double hook) applications, with cargo specific spreaders or lift beams. Single hook applications are also possible, but all must be planned, tested, and documented in accordance with local regulations and accepted industry practice.

Each new UNIHOOK™ is serialized and accompanied with a *Manufacturer's Certificate of Test and Examination*.

Model 26A105 and 26A107

Models 26A106 and 26A108

Section 2. Using a UNIHOOK™, Including "Do's & Don'ts",

2.1 The Cranston Machinery UNIHOOK™ models are connected to the lifting media (multiple wire strands, wire ropes, slings, rings, steel strapping, etc.) by manually sliding the media through the spring-loaded latch, over the hook (if the hook is in its latched position). Alternatively, the hook can be latched during the process of connecting the media. In either case, the media must not be arranged to ride against the latch. The load is now ready to be moved.

2.2 Once the load has been moved and is at rest (the weight completely relieved from the hook), pneumatic pressure is applied to unlock the hook. The line pressure should remain "on", keeping the cylinder in its retracted position, for a preset time. This preset time allows the UNIHOOK™ to be pulled free from the media. The hook freely swings open as it is lifted away from the load media.

ATTENTION- For relocating slings, or other similar applications, it is possible to unlock a loaded hook (to the maximum loads below), by applying pneumatic pressure.

- For the Models shown in Table 1, the maximum load is 45Kg/100#
- For the older Models shown in Table 2, the maximum load is 23Kg/50#

2.3 Once the preset time is reached the line pressure is exhausted, allowing the internal cylinder spring to force the cylinder back towards the latched position. The hook must be manually returned to the closed position for the cylinder's end to drop into the recess in the hook.

2.4 As noted above, UNIHOOKS™ unlatch by means of an internal pneumatic cylinder being moved by compressed air or pressurized nitrogen. The instructions in Table 1 and Table 2, and as written on the Bulletins, specify the recommended operating and maximum gas pressures. The maximums must not be exceeded. To alert the operators of a possible over pressure condition, an internal pressure relief valve (IPRV) has been incorporated in the current standard model UNIHOOKS™. The IPRV's is designed to bypass reasonable excessive pressure and to create an audible alert when the line pressure exceeds the UNIHOOKS™ maximum pressure.

2.5 The pneumatic supply hose must be routed and attached to the hook in a way that does not allow the hose to be twisted or fouled during use of the hook. At each attachment to a load, the hose position should be visually confirmed.

2.6 The UNIHOOK™ cannot be manually unlocked. It can, however, be manually removed from the load attachment by pressing the latch open and sliding the media off the hook.

2.7 Normal applications require UNIHOOKS™ to be positioned at the same level and the release actuated at the same time.

2.8 Cranston Machinery has tested the UNIHOOK™ Models with USLM strapping, in simulated lab tests to confirm hook application and the targeted 4:1 SWL of the strapping, with the following results:

2.8.1 The FIXED CAP models (26A062, 26A090, 26A093, 26A096, 26A098, 26A106, 26A108) should not be used with USLM strapping unless supported by a swivel, or other means of allowing self-alignment with the strap.

2.8.2 The LIMITED SWIVEL models (26A086, 26A094 & 26A104) must be used under specific control to assure the hook aligns with the strapping.

2.8.3 The CB4425 Hook, used in the 26A086, 26A087, 26A090, 26A094. 26A095, 26A096, 26A104, 26A105 and 26A106 models, was tested in both one-point and two-point lift configurations. Tests included repeated stress reversals of the strap material, simulating multiple lifts to the Safe Working Load of the strap. The CB4425 Hook tested to be suitable for use with both one-point and two-point lifts, in accordance with paragraph 2.8.5 below.

2.8.4 The 26A059, 26A064, and 26A076 UNIHOOKS™ (and the 26A062 UNIHOOK™, used with a swivel) with the CA4805 hook, should not be used in one-point lifts due to the hook's 1/8" edge radii. They tested to be suitable for use with USLM strapping with a spreader bar and two lift points on a single strap, in accordance with paragraph 2.8.5 below.

2.8.5 Models that tested to be suitable for use with USLM strapping must be used within all the manufacturer's instructional limits, including those related to use of damaged strapping, load limits, strap angles, strap sealing, and arrangement.

2.8.6 Cranston's evaluation was conducted under limited conditions, attempting to replicate the reported use of Cranston Machinery Hooks with USLM strapping. All Cranston Machinery hooks performed without deformation or failure. New hooks were used; use of damaged or worn hooks in the same trials or similar applications might well produce other results that further limit their application.

2.9 Support chain and links of a size and SWL appropriate to the cargo hook SWL must be attached per the manufacturer's instructions. Under load, the hook must be able to swivel to the orientation of the gear securing the load, so the hook's support chain, when under load, does not twist the lifting media against the latch. If the hook has a limited swivel attachment, the user must insure, by inspection, that the hook hangs freely to prevent this twist.

2.10 UNIHOOKS™ that do not include a swivel should be attached to a chain or spreader that has a swivel, unless utilized in a fixed configuration that orients the hook to engage the lift media without twisting the chain or lift media.

2.11 Important Do's & Don'ts.

Do:

- Ascertain that the UNIHOOK™ being used is correct for the cargo.
- Inspect for damage and correct operation before use.
- Maintain specified pneumatic pressure.
- Make sure UNIHOOK™ is used under straight-line tension only.
- Inspect every month of use (disassemble, inspect, clean, lubricate and reassemble).

- Keep everyone clear of the load.

Do not:

- Do not use UNIHOOK™ if damaged or inoperative (including latch).
- Do not exceed safe working load (noted on the UNIHOOK™ body).
- Do not actuate release when UNIHOOK™ is loaded, except in specified “light load” applications.
- Do not attach UNIHOOK™ to load if hook is to be under side or twisting tension.
- Do not operate with more than the maximum pneumatic pressure specified for the model.
- Do not use UNIHOOK™ as a hammer or anvil.
- Do not strike or force UNIHOOK™ with any hard object.
- Do not allow anyone in the fall zone of the load.

Section 3. Cranston’s Warranty and Limits of Liability for all UNIHOOK™ products,

Limited warranty. Cranston Machinery Co. Inc. (Cranston) warrants that each UNIHOOK™ manufactured by it will be free from defects in workmanship and material under normal usage and service for one year after the original sale thereof. If Cranston finds that any UNIHOOK™, is defective in workmanship or material under normal use and service, during the warranty period, Cranston will repair or replace the same, free of charge, FCA Oak Grove, OR. The liability of Cranston with respect to any defective UNIHOOK™ is expressly limited to the repair and replacement thereof as set forth in this Limited Warranty. **Except as expressly set forth herein, Cranston makes no warranties and there are no warranties, express or implied, of quality, capacity, fitness for any purpose or otherwise, of the UNIHOOK™.**

Limitation of liability. Rigging requirements, conditions of use, and maintenance of cargo handling gear is outside of Cranston Machinery Control. To determine the safe application of the Cranston Machinery UNIHOOK™, the user must evaluate each application under the condition of use and the safety factor pertinent to the appropriate industry. **Cranston will not be liable for any loss, expense or damages, including consequential damages, sustained by any buyer or user of the UNIHOOK™ by reason of any defect therein, or by reason of loss of business, profits, or time, or by reason of any interruption in or loss of use or failure in the performance of the UNIHOOK™ , or by reason of damages to other individuals, entities, or property, notwithstanding the cause which gave rise to such loss, expense or damage.**

Section 4. Common models of Cranston UNIHOOKS™, basic information, and typical applications.

Current Models, Table 1.

WARNING- The Models in Table 1, Include Cranston’s Internal Pressure Relief Valve (Patent Pending), and when the UNIHOOK™ is maintained as specified, operate more efficiently. The recommended operating pressure for these models is: .14MPa / 20PSI. The Maximum pneumatic pressure is .172MPa / 25PSI and must not be exceeded.

NOTE- Operating the UNIHOOK™ at a lower supply pressure significantly extends the compressed air or pressurized Nitrogen usage. Cranston tests’ show up to a 40% savings when using a UNIHOOK™ equipped with an IPRV.

UNIHOOK Model	SWL (MT)	Integral Swivel	Top Connection	Hook Part No.	Sling Type Multi-Wire/ Pulp units	Sling Type Steel Strapping *	Sling Type Links/Rings	Bulletin
26A104	3	180˚	Clevis	CB4425	Yes	Yes	Yes	L051
26A105	3	360˚	Clevis	CB4425	Yes	Yes	Yes	L052
26A106	3	No	Single Eye	CB4425	Yes	Yes	Yes	L053
26A107	3	360˚	Clevis	CB5417	Yes	Yes	Yes	L054
26A108	3	No	Single Eye	CB5417	Yes	Yes	Yes	L055

Previous Models, Table 2.

WARNING- The Models in Table 2, do not include Cranston's Internal Pressure Relief Safety Valve (IPRV) and operate at a recommended operating pressure of .241MPa / 35PSI. The Maximum pneumatic pressure is .275MPa / 40PSI and must not be exceeded.

UNIHOOK Model	SWL (MT)	Integral Swivel	Top Connection	Hook Part No.	Sling Type Multi-Wire/ Pulp units	Sling Type Steel Strapping *	Sling Type Links/Rings	Bulletin
26A049	3	No	Single Eye	CA8795	Yes	No	Yes	L009
26A058	3	360˚	Clevis	CA8795	Yes	No	Yes	L012
26A059	2	360˚	Clevis	CA4805	Yes	Yes	No	L017
26A062	2	No	Single Eye	CA4805	Yes	Yes	No	L010
26A064	2	360˚	Single Eye	CA4805	Yes	Yes	No	L011
26A072	3	No	Single Eye	CA8795	Yes	No	Yes	L018
26A076	2	360˚	Clevis	CA4805	Yes	Yes	No	L024
26A082	3	180˚	Clevis	CA8795	Yes	No	Yes	L019
26A086	3	180˚	Clevis	CB4425	Yes	Yes	Yes	L022
26A087	3	360˚	Clevis	CB4425	Yes	Yes	Yes	L030
26A090	3	No	Single Eye	CB4425	Yes	Yes	Yes	L034
26A092	3	360˚	Clevis	CB5417	Yes	Yes	Yes	L036
26A093	3	No	Single Eye	CB5417	Yes	Yes	Yes	L038
26A094	3	180˚	Clevis	CB4425	Yes	Yes	Yes	L042
26A095	3	360˚	Clevis	CB4425	Yes	Yes	Yes	L043
26A096	3	No	Single Eye	CB4425	Yes	Yes	Yes	L044
26A097	3	360˚	Clevis	CB5417	Yes	Yes	Yes	L045
26A098	3	No	Single Eye	CB5417	Yes	Yes	Yes	L046
26A099	1	360˚	Clevis	CB4425	Special	Special	Special	L050

Hook types.

CB4425 3MT
(Corrosion resistant)

CB5417 3MT
(Wear resistant)

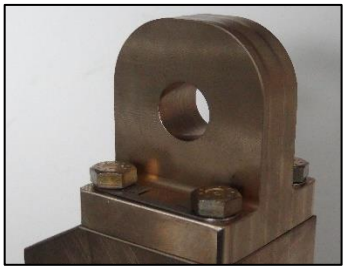
CA8795 3MT
(Obsolete)

CA4805 2MT
(Obsolete)

NOTE- Cranston offers upgrade kits to convert UNIHOOKS™ with obsolete hooks. Contact Cranston Machinery.

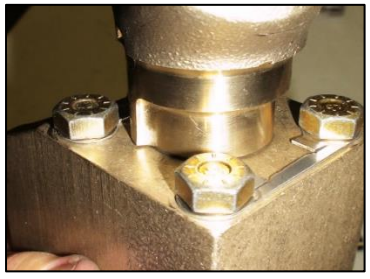
Top Cap Options

Fixed Cap – Single Eye



180° Swivel Cap – Clevis

360° Swivel Cap – Clevis



Section 5. Maintenance for Cranston UNIHOOKS™

Maintenance of all UNIHOOK™ models consists of inspection before each use, and periodic disassembly, inspection, and lubrication. Any components found worn, deformed, or damaged should be replaced before further use of the hook.

See the model specific Bulletin supplied with each UNIHOOK™ assembly and available on Cranston's website, for detailed instructions, including lubrication points.

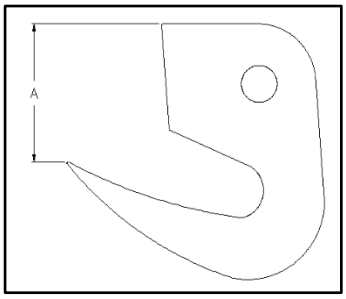
ATTENTION- Cranston assembles each hook using a NLGI #2, marine grade, calcium sulfonate base grease (Example: Lucas Marine Grease) which seals out water and inhibits corrosion. Any substitution must be NLGI #2, have a washout rating of less than 3% (typically Calcium Sulfonate or polymerized PTFE), and a viscosity of 120-220 cSt. Ensure grease not applied to threaded areas.

UNIHOOKS™ may be inspected and repaired by qualified technicians or mechanics using proper tools, procedures, original Cranston parts, and the specified lubrication. Cranston Machinery offers hook inspection and repair by factory technicians when hooks are returned to Cranston Machinery.

The measurement "A", shown to the right, is the dimension of a Cranston UNIHOOK™ as manufactured. The hook number is shown in the earlier table and the Bulletin for the respective UNIHOOK™ model.

As the UNIHOOK'S piston engages with the piston hole in the hook (latching and unlatching), further ovalizing of the hole (front to back) will naturally occur. There is ample clearance for free operation designed into the parts, however, when the distance from the side of the piston (when inserted fully in the hole) to the side of the hole, reaches 1/8" / 3mm, the hook should be replaced. Excessive wear causes an excessive gap between the latch and the tip of the hook.

Hook	Dimension "A"
CA4805	1-21/32" (42 mm)
CA8795	1-9/16" (40 mm)
CB4425	1-13/16" (46 mm)
CB5417	1-13/16" (46 mm)



WARNING- An increase in measurement "A" of 1/8" / 3mm indicates that the assembly has been overstressed by at least 4 times the Safe Working Load, and the entire UNIHOOK™ should be destroyed.

WARNING- Only use Cranston #M30600005 or #M30600006 Bolts as specified on the Model Bulletin. They are special high strength bolts. Do not substitute any other hex head bolts.

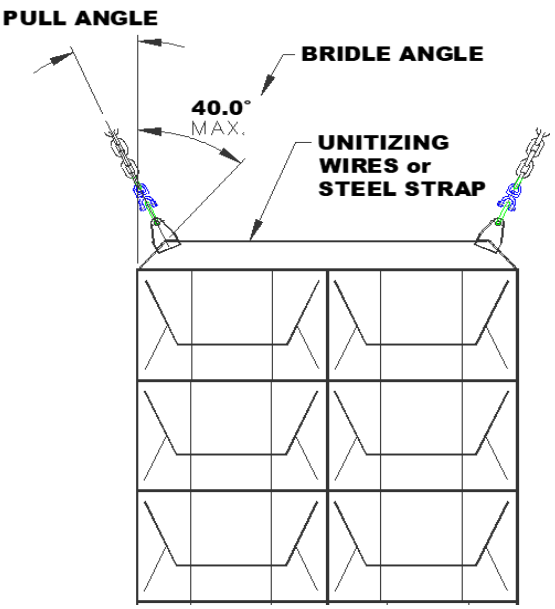
NOTE- Cranston offers Piston Assembly Tool #BB9695, to assist with gently and quickly installing the U-Cup seals.

Section 6. Safe Working Load / Factor of Safety of the UNIHOOK™

Safe Working Load (**SWL**) rating for Cranston Machinery Hooks is based on the straight pull applied to the hook. All load "below the hook" is additive to the product load being handled. Per OSHA and CE regulations, each hook is clearly marked with the SWL.

The proper **Factor of Safety** for cargo handling equipment is specified by governing agencies of a given locality and may vary with many factors. Cranston Machinery Co. Cargo Hooks are designed with a **Minimum Factor of Safety of 4:1.** Thus the minimum Safe Working Load is one quarter of the minimum ultimate strength of the hook or mechanism, based on design stresses and actual destructive tests. **Check with local authorities regarding the required factor of safety for your equipment and procedures.**

Section 7. The Effect of Angular Pulls



This diagram illustrates how, in multiple hook lifts, moving wood pulp units, the geometry effects the load applied to the hook and the lifting media.

The Bridle Angle effects the stress in the unitizing wires or strapping and must be planned by the producer of the unit and considered by all subsequent handlers of the unit. Cranston Standard CS001 provides guidance in this planning for multiple strand unitizing wire.

The **Pull Angle** directly effects the load applied to the UNIHOOK™. When using two hooks on a common unit binding media each hook bears half the unit weight if there is no pull angle. With a pull angle of 40 degrees, the load on each hook is half the unit weight divided by .776, or 30.5% more. The table below the diagram provides a factor, the cosine of the angle, for angles between 5 and 40 degrees.

PULL ANGLE	5	10	15	20	25	30	35	40
FACTOR (Cosine of Angle)	0.996	0.985	0.966	0.940	0.906	0.866	0.819	0.766
RESULTANT HOOK LOAD	100.4%	101.5%	103.5%	106.4%	110.4%	115.5%	122.1%	130.5%

Section 8. Suggested Instructions for Stevedores and Longshoremen

4.1 When using Cranston Machinery Cargo Hooks, observers are forbidden to stand under or near a hanging unit, or within the fall area of a moving load.

4.2 When using Cranston Machinery Cargo Hooks, all hook riggers must be clear of the load before lifting of the unit commences, and clear of the fall area of the load. Likewise, all individuals must stand clear until the load is relieved from the hooks and is completely at rest. (Crane or load may swing or shift without warning).

4.3 When loading or unloading, only one crew is to work in a cargo space unless work areas are properly guarded to confine multiple crews to their own work area.

4.4 When using Cranston Machinery Cargo Hooks, any load with missing or damaged lifting wires or straps must be lifted with extreme caution to the point where it can be lifted out with an appropriate sling.

4.5 When lifting or lowering with Cranston Machinery Cargo Hooks, sudden acceleration and braking of the crane must absolutely be avoided. Cranes which permit “free-running” lowering of the load are not permitted to be used. The operator must gently take the slack out of all lift components, to allow visual confirmation that proper hook connections or disconnects have been made.

4.6 Cranston Machinery has no responsibility for the tools or crews used or activities of individuals involved in attaching or releasing units to or from Cranston Machinery Cargo Hooks. Local regulations and safety precautions must be followed.

4.7 All individuals involved in the use, inspection and maintenance of cargo handling equipment must be properly trained and authorized.

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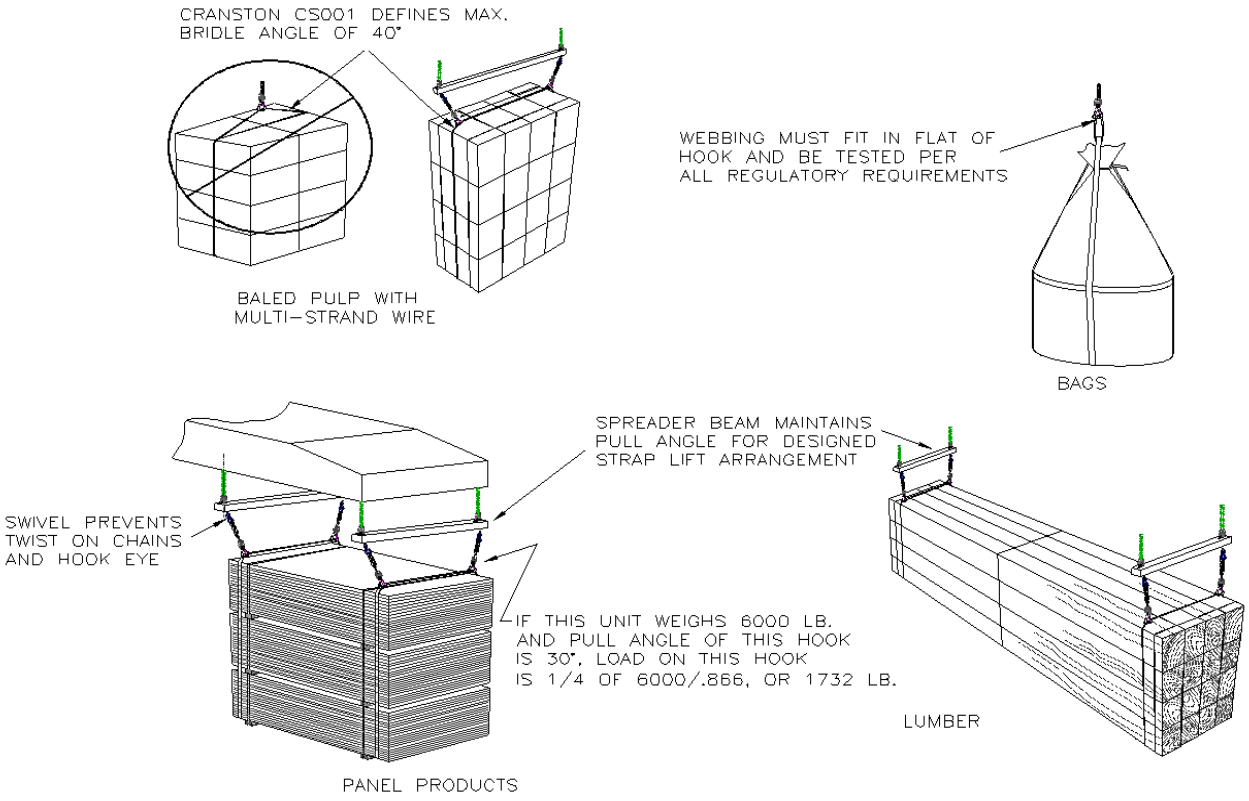
Section 9. Cargo Hook arrangements

The diagrams below show some acceptable and unacceptable Cranston UNIHOOK™ arrangements, applied according to hook SWL limitations.



The use and maintenance of cargo handling gear is outside Cranston Machinery's control. Therefore, the user must conduct his own evaluation, under the conditions of his normal use and to the safety factor pertinent to his industry, to verify the safe application of Cranston Machinery hooks with his application.