STANDARDS FOR TANDEMLOC SLING & BELOW THE HOOK LIFTING DEVICES MANUFACTURING & TEST SPECIFICATION NOTES

1. **Proof Testing (unless otherwise specified on the Tandemloc drawings):**
   A. All below the hook lifting devices are manufactured in accordance with ASME B30.20 and are proof loaded to conform to that specification and OSHA 2232 (1918.61), as follows:

WORK LOAD LIMIT (WLL)	PROOF LOAD
Up to 40,000 Lb.	25% in excess of load limit
Above 40,000 Lb. to 100,000 lb.	10,000 lb. in excess of load limit
Over 100,000 Lb.	10% in excess of load limit

   B. All chain, wire rope and synthetic pendant slings are manufactured in accordance with ASME B30.9 and are proof loaded to 200% of the work load limit.
   C. All comml shackles, hooks, chain connectors and rings are proof tested to 200% of WLL.
   D. All I.S.O. container lifting spreaders are proof tested to 125% of the work load limit.
2. **Marking Below the Hook Lifting Devices:**
   A. Decals of self adhering vinyl are used to mark both sides with the work load limit (WLL), and the Tandemloc logo. Additional marking, when required, shall be noted on the Tandemloc drawing.
   B. The WLL limit color is black and the Tandemloc logo color is red unless otherwise specified on the Tandemloc drawings.
   C. Letter height of the decals are 5" unless space does not allow it. On smaller spaces, the max. letter height to fit the space is used.
   D. The WLL marking is located in central locations so that it is both highly visible and right side up during use.
   E. A test certification tag (AA24000A-CP1) is permanently attached, showing Tandemloc I.D., Part No., Serial No., Weight and Work Load Limit.
3. **Marking Slings:**
   A. A sling leg is metal tagged (AA24000A) showing use, work load limit, part no., size, length and Tandemloc I.D.
   B. Lift components are safety marked in accordance with ASME Z535.4.

DESIGN SERVICE CLASS and LIFE CATEGORY PER ASME BTH-1-2017

Unless otherwise specified on the product drawing, the design category used is “B" (S.F. 3:1 to yield) and the service life is Class "O" (up to 20,000 load cycles), except that ISO container lift spreaders have a service life Class "1" (up to 100,000 load Cycles). Different design categories and service classes must be defined by the buyer prior to order placement. The lifting product will then be custom engineered to meet the specified requirements.

SERVICE TEMPERATURES OF TANDEMLOC LIFT DEVICES

All lift devices and slings sold by Tandemloc are made in conformance to ASME B30.20 (below the hook lifting Devices) and ASME B30.9 (slings) unless otherwise noted. These specifications require the user to perform a pre-lift equipment inspection and limit the amount of impact and shock loading to minimal. This is of extreme importance especially when the service temperature goes below 35°F, and increasingly important with each degree lower. On this basis, the Tandemloc standard equipment is useable in temperatures of 150°F down to 25°F. (Temperature range per ASME BTH-1).

The user has the option of purchasing ASME B30.20 below the hook lifting devices, made for arctic service (reducing the minimum temperature from 25°F to a range of minus 20°F - minus 50°F.) These devices may

SERVICE TEMPERATURES OF TANDEMLOC LIFT DEVICES (continued)
be made from special steels which are produced to withstand Charpy impact tests made as low as minus 50°F, however it may not be possible for certain design styles and working load limits, as materials may not be readily available. The user must still avoid impact and shock loading and perform the careful pre-lift inspection noted above, but will have an extra margin of safety. The high temperature limit is 150°F.

Cold Temperature Considerations and Below the Hook Lifting Products.

Operating lifting equipment (under the ASME B30.20 specification for below the hook lifting devices) in cold temperatures (below 25°F) does not in and of itself require the use of cold temperature materials in their manufacture. In fact, as the temperature drops, steels in general will become stronger with respect to their yield strengths. What cold temperature does is tend to make steels become more brittle.

In order for cold temperatures to reduce the safety of a steel lifting product, there must be a sufficiently sudden and substantial impact load applied (or vibration loads), along with a sudden change in material volume in highly stressed areas, through a given piece of lifting equipment. This sudden change of volume is more commonly referred to as a stress riser. These can be in the form of a notch, crack(s), or thin wall attached to a thick wall, for example. ASME B30.20 expressly forbids the end user from applying impact or shock loads to lifting equipment certified under that specification. Without both a suddenly applied load, and a stress riser, cold temperatures will have no effect on the safety of a given lifting product. In fact the safety factor to yield will go up. A stress riser without impact loading (or vibration) will not be more likely to cause failure in cold temperatures, nor will impact loads without a stress riser be more likely to cause failure in cold temperatures. Tandemloc lifting products are designed with at least a 3:1 factor of safety to yield, and that safety factor already considers any stress risers in the system. (all lifting products should be checked for cracks on a regular basis.) Slowly applied forces such as should be encountered during a lift under asme B30.20 will not cause stress risers to lead to failure more readily in cold temperatures. In fact since the yield strength Is increased in cold temperatures, the product will have a greater factor of safety under static or slowly applied loads.

If impact (or substantial vibration) loads are unavoidable in your lift, and the design of the lifting product has stress risers in high stressed areas, cold temperature materials could be part of the solution for your lifting product. However, it should be remembered that impact loading is not covered under the ASME B30.20 specification, and therefore a different specification may be required for your lifter, which should consider dynamic loading.

Tandemloc currently designs all lifters to ASME B30.20 which considers static loading only. We offer cold temperature steels in our designs as a courtesy to our customers, but these lifters are still designed to ASME B30.20 and impact loading will void the warranty as well as be a violation of the specification.

In summary, do not assume that operating your lifts in cold temperatures alone are sufficient reason to incur the substantial additional expense of using cold temperature materials in your lifter. Please talk with your sales representative and Tandemloc engineering to make an informed decision about your lifting requirements.

Pre-lift inspection procedures are noted in ASME B30.20 and ASME B30.9 available from ASME.
Tandemloc recommends that before any low temperature lift or after any accidental damage occurrence that the device is inspected for cracks, gouges and deep scratches in high stress areas. Repair and re-test before using.

SUPPLEMENTARY DATA

ASME B30.9 (2003) defines service temperatures for sling materials as follows:

Alloy GR80 or 100 steel chain:	400°F to minus 40°F
Steel wire rope IWRC:	400°F To minus 40°F
Steel wire rope with fibre core:	180°F to minus 40°F
Steel mesh:	See specification for many alternatives
Synthetic media:	140°F to minus 40°F. See specification for certain types which have higher maximum service temperatures.

The above supplementary data is for reference only. Actual service temperatures must be confirmed when purchasing. Sling assemblies will have fittings and other components which will affect service temperatures.

WORK LOAD LIMITS AND NON-UNIFORM LOADING

Unless otherwise stated, Tandemloc below the hook lifting devices work load limits for I.S.O.668 & I.S.O.1161 freight containers are based on a uniformly loaded container. Non-uniformly loaded containers require a reduction of the work load limit to prevent a higher loading of a structural container component than the load occurring in a uniform lift.

APPLICABLE STANDARDS

Additional information can be obtained from the following sources:
ASME B30.9-Slings, ASME B 30.10-Hooks, ASME B 30.20-Below the Hook Lifting Devices, ASME B 30.26-Rigging Hardware, OSHA Regulation of CFR 29 1910.184-Slings and ISO 3874 for Container Lifting.

REVISIONS

Revision	Description	Date	Approved
A.	Added 4 B. Data	12/15/03	MD
B.	ASME was ANSI 3 places.	01/13/06	MRD
C.	Proof load Note 1 said 125% of WLL only. Added shackles, chain conn., Hooks, ring,& ISO container spreader proof test data in Note 2.	01/10/07	MD
D.	Added service temperature data.	03/15/07	MD
E.	Corrected spelling & sentence structure of all words. Added supplementary data. Final review completed for reissue.	03/21/07	MD
F.	Added service class & lift data.	6/29/07	MD
G.	Added work load limit and non uniform loads for I.S.O. containers	10/10/07	MD
H.	Added applicable standards	11/10/08	DAH
I.	Added “Cold Temperature Considerations…” (1 Line and 5 Paragraphs)	4/1/09	DAH
J.	Revised standard temperature range was 150 to -40F. Added addition caveats to cold temp designs.	9/13/10	WDD
K.	BTH-1-2011 was BTH-1-2005	11/29/12	DAH
L.	BTH-1-2014 was BTH-1-2011	03/26/15	DAH
M.	BTH-1-2017 was BTH-1-2014	05/16/17	DAH