



MILITARY COMMITTEE LAND STANDARDIZATION BOARD (MCLSB)

3 April 2009

NSA(ARMY)0409(2009)CSS/2830

MCLSB

STANAG 2830 CSS (EDITION 5) – MATERIAL HANDLING AIDS

Reference:

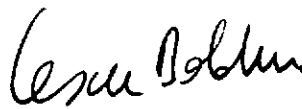
- A. MAS(ARMY)374-MH/2830, dated 4 December 1996 (Edition 4)
- B. NSA(ARMY)0684(2007)CSS(MH)/2830, dated 12 December 2007 (Edition 5)
(Ratification Draft 1)

1. The enclosed NATO Standardization Agreement, which has been ratified by nations as reflected in the NATO Standardization Document Database (NSDD), is promulgated herewith.

2. The references listed above are to be destroyed in accordance with local document destruction procedures.

ACTION BY NATIONAL STAFFS

3. National staffs are requested to examine their ratification status of the STANAG and, if they have not already done so, advise the MCLSB NSA, through their national delegation as appropriate of their intention regarding its ratification and implementation.

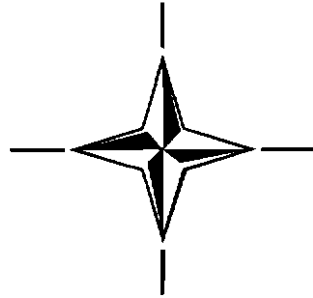

 Juan A. MORENO
Vice Admiral, ESP(N)
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Enclosure:

STANAG 2830 (Edition 5)

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**NORTH ATLANTIC TREATY ORGANIZATION
(NATO)**



**NATO STANDARDIZATION AGENCY
(NSA)**

**STANDARDIZATION AGREEMENT
(STANAG)**

SUBJECT: MATERIAL HANDLING AIDS

Promulgated on 3 April 2009

Juan A. MORENO
Vice Admiral, ESP(N)
Director, NATO Standardization Agency

NATO/PfP UNCLASSIFIED

RECORD OF AMENDMENTS

No.	Reference/date of Amendment	Date entered	Signature

EXPLANATORY NOTES

AGREEMENT

1. This STANAG is promulgated by the Director NATO Standardization Agency under the authority vested in him by the NATO Standardization Organisation Charter.
2. No departure may be made from the agreement without informing the tasking authority in the form of a reservation. Nations may propose changes at any time to the tasking authority where they will be processed in the same manner as the original agreement.
3. Ratifying nations have agreed that national orders, manuals and instructions implementing this STANAG will include a reference to the STANAG number for purposes of identification.

RATIFICATION, IMPLEMENTATION AND RESERVATIONS

4. Ratification, implementation and reservation details are available on request or through the NSA websites (internet <http://nsa.nato.int>; NATO Secure WAN <http://nsa.hq.nato.int>).

FEEDBACK

5. Any comments concerning this publication should be directed to NATO/NSA – Bvd Leopold III - 1110 Brussels - Belgium.

NATO STANDARDISATION AGREEMENT
(STANAG)

MATERIALS HANDLING AIDS

Annexes:	A.	Bridge Plates
	B.	Lifting Slings
	C.	Vehicle Loading Ramps
	D.	Crane Mounted Fork Attachment
	E.	ISO Container Spreader Beams
	F.	Hook Ends and Rings
	G.	Lexicon
	H.	Test Data Sheet

Related Documents:

STANAG 2827	-	Materials Handling in the Field.
STANAG 2828	-	Military Pallets, Packages and Containers.
STANAG 2829	-	Materials Handling Equipment.
STANAG 2927	-	Marking of Restraint Equipment for Road Transport.
STANAG 3466	-	Responsibilities of Air Transport Units and User Units in the Loading and Unloading of Transport Aircraft in Tactical Air Transport Operations.
STANAG 4101	-	Towing Attachments
STANAG 3542	-	Technical Criteria for the Transport of Cargo by Helicopter.
STANAG 4062	-	Slings and Tie Down Facilities for Lifting and Tying Down Military Equipment for Movement by Land and Sea.
AAP-6	-	NATO Glossary of Terms and Definitions (English and French).
AAP-24	-	Materials Handling Glossary of Terms and Definitions.
ISO 668	-	Series 1 Freight containers-Classification, dimensions and ratings.
ISO 1161	-	Series 1 Freight containers-corner fittings-specification.
EN 12385	-	Parts 1, 2 & 3 Steel Wire ropes.
EN 12195	-	Parts 2, 3 & 4. Web lashing made from man-made fibres; lashing chains and lashing steel wire ropes.
EN 818	-	Part 1, 2, 3, 4, 5, 6, & 7. Short link chain for lifting purposes.
DIN 82003	-	Part 1 & 2. DEU norm for accessories for lifting purposes.

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ISO 2331	-	Fork lift trucks, hook on type fork arms.
EN 696	-	Fibre ropes.
EN 697	-	Fibre ropes.
EN 698	-	Fibre ropes.
EN 699	-	Fibre ropes.
DIN 83305	-	Part 2 Fibre ropes.

AIM

1. The aim of this agreement is to ensure that materials handling aids used by the NATO forces are functionally interchangeable and to establish standard safety procedures. This agreement does not absolve any nation or user of their additional obligations in complying with relevant national or international legislation regarding the safe use of materials handling aids described in this STANAG.

AGREEMENT

2. Participating nations agree to adopt the characteristics for materials handling aids as described in this STANAG.

DEFINITION

3. The following terms and definitions are used for the purpose of this agreement only:

- a. Factor of Safety: The ratio between the minimum breaking load and safe working load (SWL).
- b. Testing Coefficient (Proof Load): This is the product of the SWL and Factor of Safety.

GENERAL

4. The agreement does not aim at eliminating or modifying existing materials handling aids where this will entail considerable expenditure, but at applying the provisions of this agreement to future planning for the introduction of new equipment.

5. All restraint equipment shall be marked in accordance with the requirements of STANAG 2927. Other items shall be fitted with a data plate giving minimum load capacity or SWL as appropriate.

6. Throughout this agreement, dimensions are given in both millimetres (mm) and in inches (in) and weights are given in kilograms (kg) and pounds (lb).

7. An increasing number of national and international standards relevant to this field of work is being generated. Certain of these are included in 'Related Documents' for information purposes so that users might find these important references more readily. However the list of relevant standards is continually changing and users should assure themselves of the status of these references and any other related documents.

IMPLEMENTATION OF THE AGREEMENT

8. This STANAG will be considered to have been implemented when the necessary orders / instructions have been issued to the effect that when the equipment covered by this agreement is produced (or ordered by a non-producing nation) it will be produced (or ordered) in accordance with the characteristics laid down in this agreement.

BRIDGE PLATES

1. The purpose of a bridge plate is to span the gap which may occur at a point of load transfer such as between a vehicle and a loading / unloading dock, and to provide a transition to compensate for difference in platform heights.

2. The dimensions and characteristics of a bridge plate will be dictated frequently by the space available at the point where it is to be employed. Standardisation in detail will therefore be inappropriate. The use of the bridge plate will be hindered if:

- a. The slope of the plate is excessive. The use of a bridge plate would be inappropriate if the height difference and distance between transfer resulted in a slope greater than 1 in 15.
- b. Its width is insufficient to permit manoeuvring by equipment moving standard loads.
- c. Its capacity is insufficient to accept a loaded Category A or B forklift trucks, defined in STANAG 2829.
- d. Its weight was so great that it could not readily be moved into position.

3. Areas for standardization. In order to satisfy the above factors it is agreed that the following criteria are to be applied to bridge plates:

a. Minimum Width

- (1) 1,500 mm (60 in) for Category A forklift trucks.
- (2) 2,200 mm (86 in) for Category B forklift trucks.

Note: For ease of manual handling and transportation narrower plates (i.e., 600 mm wide (24 in)) may be used.

- b. Minimum Capacity. To accept a rolling load of not less than 7,250 kg (16,000lb).
- c. Safety factor: 200% of rated capacity.

d. Handling

- (1) A bridge plate designed for manual placement shall be of such a weight and configuration as to facilitate ready handling by not more than four men. Such bridge plates may have lifting devices suitable for use with forks or slings.
- (2) Bridge plates, designed to be lifted with equipment, shall have lifting eyes, in accordance with STANAG 4062.

e. Locking Feature. Means shall be provided to prevent slippage of the bridge plate in either direction.

4. Safety Considerations.

- a. Safety Curbing. Bridge plates shall have a safety curbing along the full length of the sides. The curbing height shall be a minimum of 50 mm (2 in) above the bridge plate top floor surface. The curbing shall have all edges and corners rounded.
- b. Floor Surface. The floor surface of bridge plates shall have raised safety tread or open mesh type floor pattern. Both ends of the bridge plate floor surface shall be bevelled along the entire width.
- c. Position lockstop/backstop and retaining device
 - (1) Bridge plates intended for use with rail cars shall be provided with a fixed position lockstop/backstop and an adjustable retaining device. The retaining device shall be adjustable in 50 mm (2 in) increments in a range between 254 mm (10 in) and 1066 mm (42 in). The lockstop/backstop and retaining device shall act as a positive stop in both directions under conditions of 0 mm to plus 152 mm (6 in) height differential between the loading platform and the rail car.
 - (2) Bridge plates intended for use with trucks shall have a fixed position lockstop/backstop. The position lockstop/backstop shall act as a positive stop in both directions under conditions of 0 mm to plus 152 mm (6 in) height differential between the loading platform end and the truck end. The lockstop/backstop shall allow truck park out within 50 mm (2 in).

LIFTING SLINGS

1. This Annex defines standardisation areas for lifting slings used in crane handling and similar operations so as to ensure safety in usage. This Annex does not apply to slings used in helicopter operations, which shall be in accordance with STANAG 2949.
2. Lifting slings are to be used to lift a wide variety of loads and to interface with crane hooks. These slings may be made up of:
 - a. Steel wire ropes.
 - b. Steel chains.
 - c. Natural or synthetic fibre ropes.
 - d. Webbing.
 - e. Nets.
3. To ensure safety in usage, nations will:
 - a. Define basic data to be used in calculating the maximum permissible working load limit for the complete sling.
 - b. Be able to mark this working load limit (WLL) on the sling.
 - c. Inspect periodically the general condition of the complete sling and rate its capacity in relation to its original working load.
4. Whenever any sling is used, the following practices shall be observed: Slings
 - a. That are damaged or defective shall not be used.
 - b. Shall not be shortened with knots or bolts or other makeshift devices.
 - c. Shall not be kinked.
 - d. Shall not be loaded in excess of their SWL.
 - e. Shall have their loads balanced to prevent slippage.

- f. Shall be securely attached to their loads.
 - g. Shall be padded or protected from the sharp edges of their loads.
 - h. Shall not be pulled from under a load when the load is resting on it.
 - i. Shall not be dragged on an abrasive surface or over the floor.
 - j. Shall be stored in an area where they will be protected from mechanical damage, corrosive action, moisture, or extreme heat.
5. All personnel shall be kept clear of loads about to be lifted and of suspended loads.
6. Hands or fingers shall not be placed between the sling and the load while the sling is being tightened around the load. Gloves should be used at all times.
7. Shock loading is prohibited.
8. Spreader bars or beams should be used when appropriate. Tag lines should be used for finite control of loads when positioning (Figure B-1).

Spreader Bars

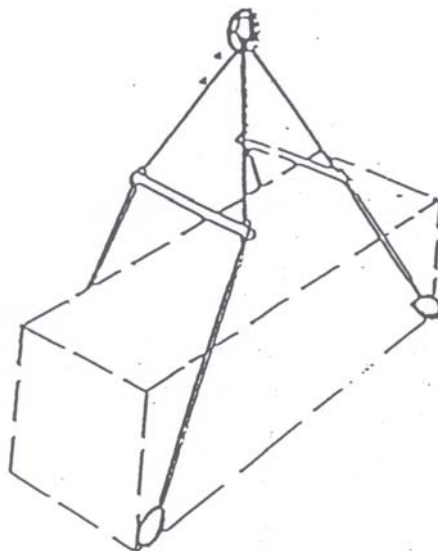


Figure B-1

9. Areas for standardisation. Standardisation is hereby agreed in the following areas:
- a. Factor of Safety: Shall be as follows:
 - (1) Minimum of 5:1 for steel wire rope slings.
 - (2) Minimum of 4:1 for steel chain slings (Grade 80).

- (3) Minimum of 5:1 for steel chain slings (High Tensile steel).
- (4) Minimum of 7:1 for synthetic slings.

b. Testing Coefficient:

- (1) Steel wire rope slings: 2 x SWL.
- (2) Steel chainslings: 2 x SWL.
- (3) Textile fibre ropes: No Proof Test, only a Certificate of Conformity.
- (4) All metal parts of the sling: 2 x SWL.

Note: This does not preclude nations from adopting their own higher standards.

c. Inspection. A thorough periodic inspection of slings in use shall be made on a regular basis and written records maintained, to be determined on the basis of:


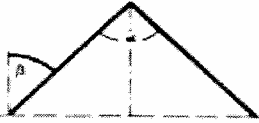


- (1) Frequency of use.
- (2) Severity of Service conditions.
- (3) Nature of lifts being made (e.g. when lifting dangerous loads such as ammunition and hazardous materials) daily or before use check should be carried out.
- (4) Experience gained on the service life of slings being used in similar circumstances. Such inspections shall in any event be at intervals no greater than once every 12 months.
- (5) A tag showing the date of inspection and the maximum load in metric tonnes (tons) shall be attached to the sling.

d. Working Load. Maximum mass expressed in kg (lb) that a sling is permitted to lift vertically (Table B-1).

Table B-1

LOAD-BEARING CAPACITY OF CHAIN SYSTEMS

Load-bearing capacity of one and multi-strand chain systems with different spread angles

Allocation of quality class tags to sling chain	1-strand	2-strand		3- and 4-strand		
						
Angle of inclination β	0	45°	60°	45°	60°	to be used for single hooks DIN 15401 for 1-, 2-, 3-, 4-strand chains
Spreader angle of strands (ALPHA) α	0	(90°)	(120°)	(90°)	(120°)	
Reducing or increasing factor according to angle (BETA)	1	1.4	1	2.1	1.5	
Nominal thickness of chain in mm	Load carrying capacity in kg *					number
10	4,000	5,600	4,000	8,400	6,000	
16	9,600	13,400	9,600	20,000	14,400	

* For conversion to pounds (lb) multiply these figures by 2.2

In the case of asymmetry (load is tilted) the following points have to be observed:

- a) 2-strand chains must only be loaded with the load-carrying capacity specified on the quality class tag for a maximum angle of inclination strands β (BETA) up to 60° ,
- b) 3- and 4-strand chains with an angle of inclination of
 1. β up to 45° with the maximum load-carrying capacity specified on the tag for a maximum angle of inclination β up to 60° ,
 2. $\beta = 45^\circ$ to 60° only with 2/3 of the load-carrying capacity specified on the tag for a maximum angle of inclination up to 60° .

VEHICLE LOADING RAMPS.

1. This Annex describes portable loading ramps for loading and unloading with forklift trucks between ground level and the floors of rail wagons, trucks or trailer equipment. These ramps are intended for access with Category B forklift trucks not exceeding 2 metric tonnes in capacity.

2. General Characteristics, Category B Vehicle Loading Ramps.

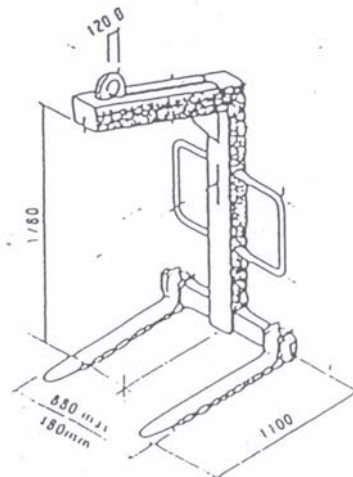
- a. Capacity minimum: 7,250 kg (16,000 lb).
- b. Safety Factor: 200 % of rated capacity.
- c. Overall length: Minimum 9,090 mm (358 in) as follows:
 - (1) Incline section: 9,150 mm (360 in).
 - (2) Level off section: 1,830 mm (72 in).
- d. Useable Width: Minimum 2,140 mm (84 in).
- e. Safety curb height: 300 mm (12 in) minimum.
- f. Operating range: from 1,140 mm (45 in) to 1,650 mm (65 in) above ground level.
- g. Towing speed: Be capable of being towed at 40 km / h (25 mph) over improved roads.
- h. Towing Bar: Detachable, positioned to allow ramp to be towed in a level position. Towing eye to be compatible with standard military towing hooks, in accordance with STANAG 4101.

CRANE MOUNTED FORK ATTACHMENT

1. The purpose of the fork attachment pallet lifter is to allow a crane hook to safely and quickly lift a pallet without the need for the operator to have to attach slings through or around the pallet.
2. The lifting hook can be attached to either a fixed point or to a moving (sliding) point.
 - a. If the point is fixed it is usually positioned so as to provide a safe lift attitude for the most commonly lifted load. This allows the load to be lifted horizontally or slightly tipped back to stop the load slipping off the forks. The forks shall be adjustable in width to cater for standard NATO pallets and POL pallets as detailed in STANAG 2828.
 - b. If the point is moveable there are 2 options:
 - (1) Pre-positioned locations to which the operator moves the lift point according to the weight being lifted.
 - (2) Automatic positioning where the lift point moves to its optimum position as the load is taken up.
3. When being transported by the load carrying vehicle the fork attachment can be left positioned within a pallet. The lift eye shall have a minimum diameter of 120 mm (4.7 in).

Note: To handle the GBR/USA ammunition loads a distance in excess of 1,400 mm (55 in) is required between tines and lifting arm.

Figure D-1.



ISO CONTAINER LIFTING SPREADER BEAMS.

1. ISO container lifting spreader beams are used to allow a crane to safely and quickly lift an ISO container that conforms to ISO 668. They are usually designed to fit a particular size of container (i.e. 20 ft or 40 ft) and each corner is fitted with a twist lock fitting that shall interface with corner fittings that conform to ISO 1161. The twist locks can be locked by a variety of methods (i.e. manually operated from the ground or hydraulically from the cab of the crane).

- a. Manually as shown in Figure E-1, each one located at the bottom of the container, this removes the need to climb onto the top of the container to connect up.
- b. Manually as shown in Figure E-2 where the frame locates in the top corners and the locks are operated manually by a lever.
- c. Automatically operated twist lock frame as shown in Figure E-3. The locks are operated by a ratchet lever operated by the crane hook.
- d. Power operated twistlock frame as shown in Figure E-4. The locks are operated by wire control or radio frequency from the crane cab. The power is supplied by a self-contained hydraulic power unit which can also be used to adjust the frame from 20 ft to 40 ft.

2. Containers can also be lifted using a lightweight container spreader beam and lifting strops as shown in Figure B-1 of Annex B. These have the advantage that they can be placed inside a container or load carrier for transportation and are easily assembled manually.

Note: Do not use if:

- a. Any of the twistlocks are not fully operational (i.e. twist fully when operated), and inspect visually for damage prior to use.
- b. Any damage is apparent on the slings or there are any cracks on the structure of the equipment.

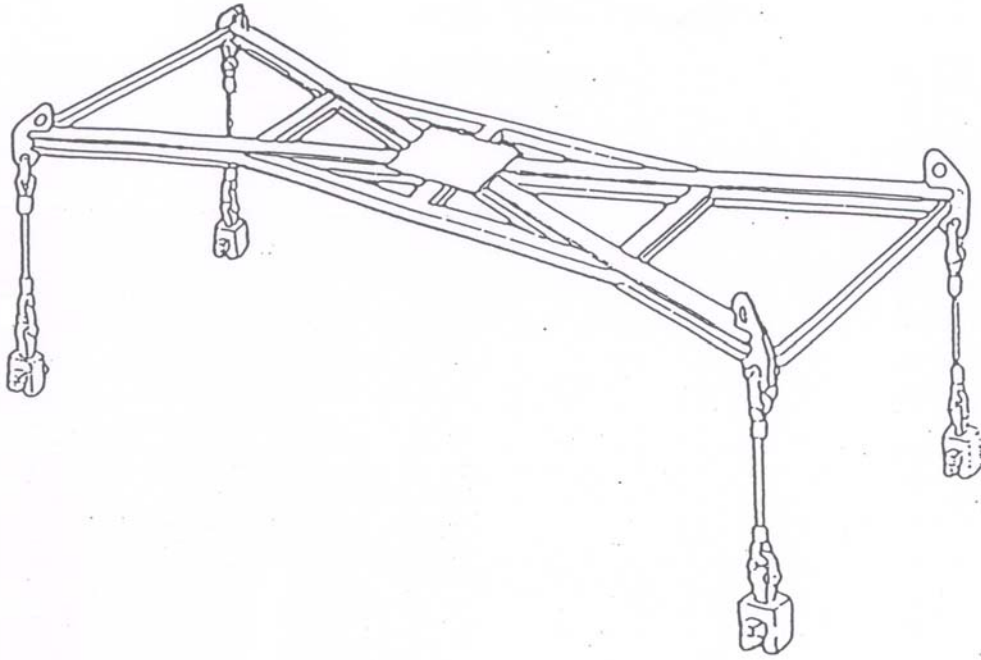


Figure E-1

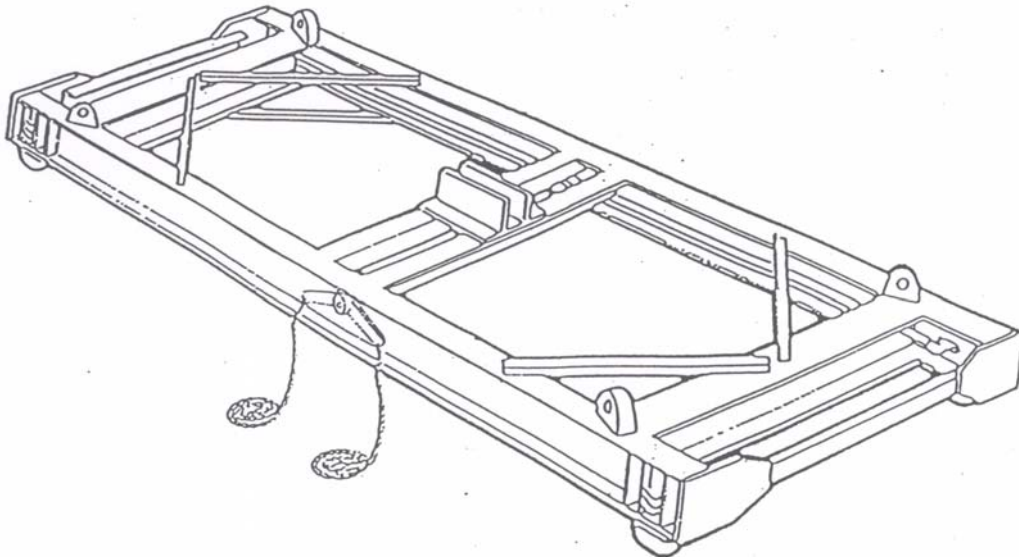


Figure E-2

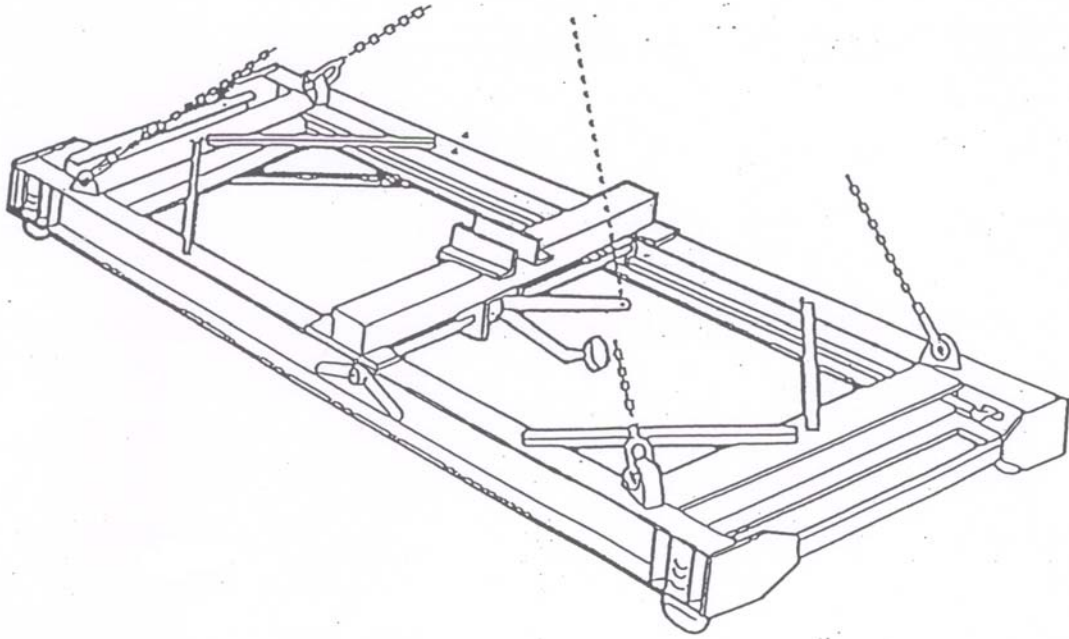


Figure E-3

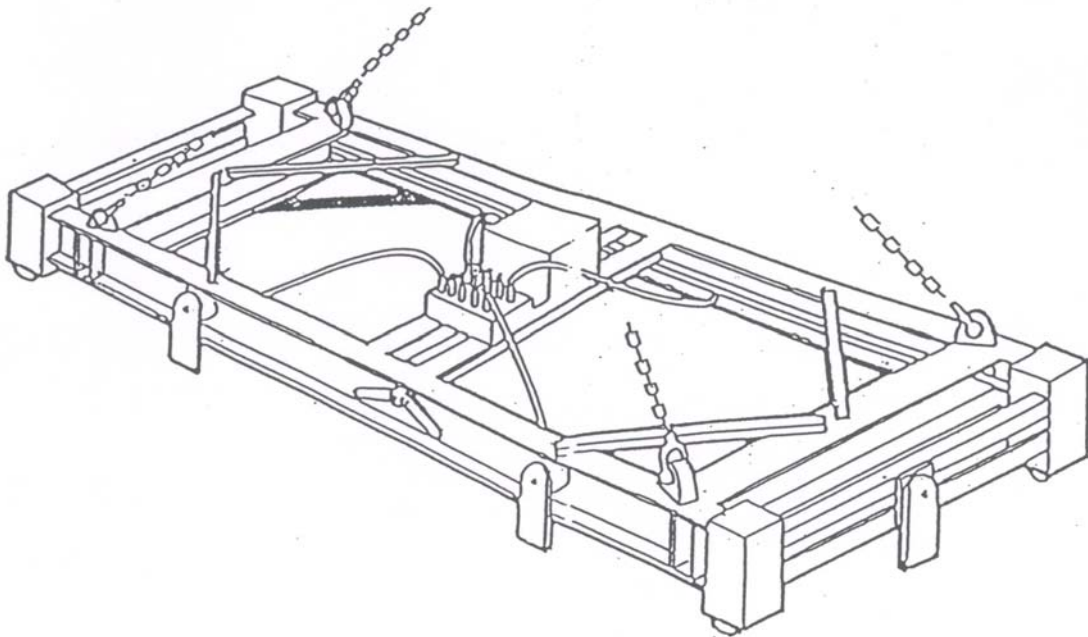


Figure E-4

HOOKS ENDS AND RINGS

1. Hook Ends. The type of hook ends will depend upon the type of restraint equipment being used:
 - a. Chain restraints should be fitted with grab type hook ends. Tensioners should have a similar type end allowing an infinite amount of adjustment.
 - b. Webbing and wire restraints should preferably be fitted with a narrow hook or S type hook with a typical diameter of 16 - 26 mm. EN 12640 calls for the following: If the lashing point has a round inside profile, then the useable inside diameter shall be > 40 mm. If it is oval, then the clearance in the most unfavourable angle position shall have a width of > 25 mm and a length of > 40 mm. See Figures F-2 and F-3. Hook ends need to be sized to connect with the facilities described in the table listed in Appendix 3 to Annex A to STANAG 4062.
2. Examples of some interoperable hook ends (others can be also utilised). These show open type and one fitted with safety catch.

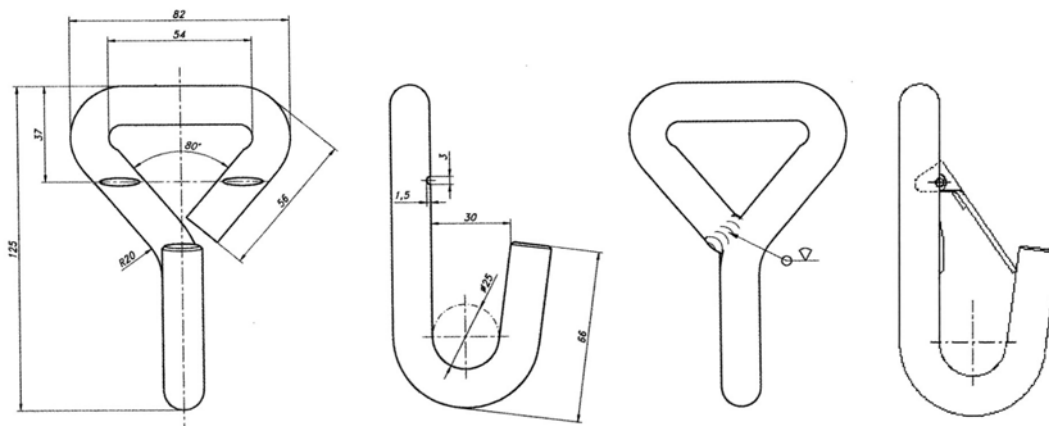


Figure F-1.

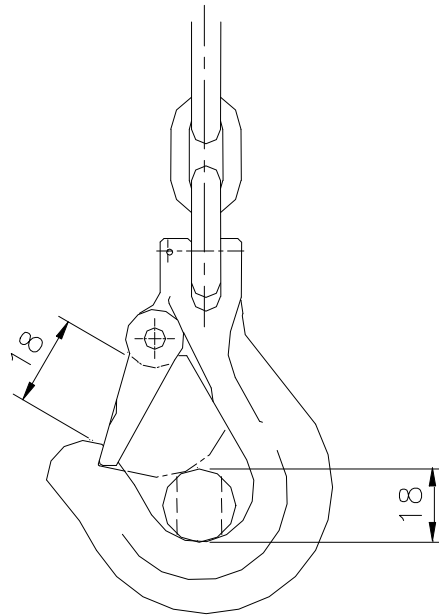


Figure F-2

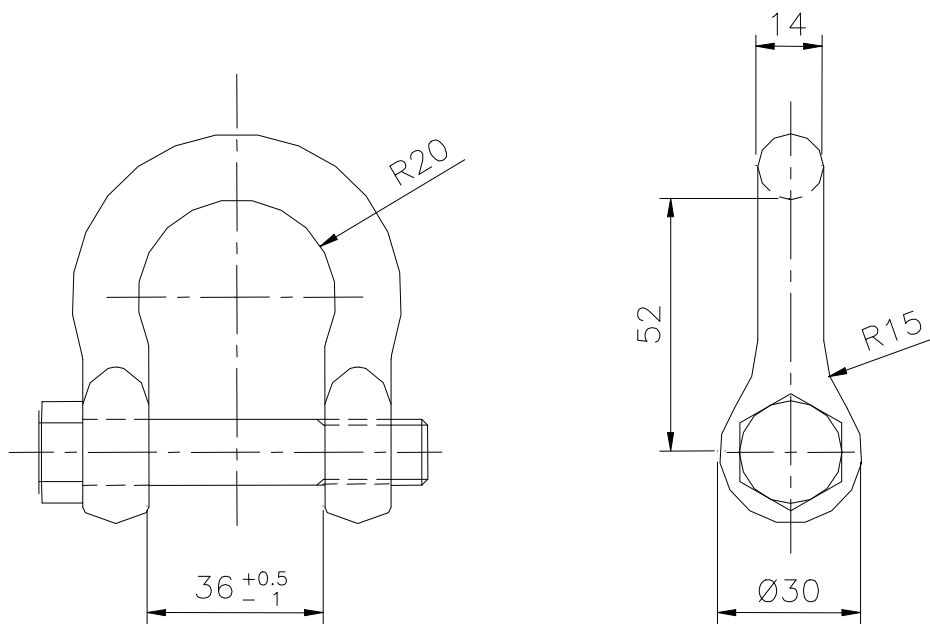


Figure F-3

Dimensions in millimetres

LEXICON

1. **bridge plate/passerelle portative**

A portable bridging plate for spanning a gap between loading area and container or deck.

2. **loading ramp/rampe de chargement**

A sloping access platform of fixed gradient for loading/unloading stores and equipment. The ramp may be fixed or portable.

3. **sling/élingue**

Ropes or chains fastened round an object that is to be lifted by crane etc, and provides a point of suspension.

- bale/pour balles. Two short lengths of short link chain or wire rope connected at one end to a ring, and each lower end fitted with spiked hooks.
- barrel/pour fûts. A continuous length of short link chain connected to a terminal ring fitted with a pair of sliding cam hooks.
- braided/tressée. A highly flexible sling normally braided from 4 pairs of wire ropes, and having soft eye terminals into which thimbles may be secured.
- cargo/de suspension. A strap, chain or other material used to securely hold cargo items that are to be hoisted, lowered, or suspended.
- case/pour caisse. A continuous length of short chain connected to a terminal ring, fitted with a pair of sliding case hooks, having spikes and designed for lifting wooden cases.
- endless/sans fin. A continuous length of short link chain or wire rope having no terminal components.
- fibre webbing flat/plate en fibre tressée. A flat lifting sling made of fibre webbing, usually synthetic, folded and stitched to provide soft terminal eyes, or to be made endless. Alternatively the soft eyes may be stitched over reeveable or non-reeveable plate terminals, triangular links or other suitable end fittings.

- flat fitting/en sangle plate. A sling or belt type designed to wrap around a load and to support it across its whole breadth. It may terminate in reeveable or non-reeveable end fittings, or may be endless.
- four leg/à quatre brins. Four lengths of short chain or wire rope, connected at one end to a ring assembly, and each lower end fitted with a hook.
- lead/pour tube. Two lengths of short link chain or wire rope connected at one end to a ring, and each lower end fitted with a suitable hook, designed to be inserted in each end of a roll of rigid material.
- non-reeveable collar/à oeillet non coulissant. A length of short link chain or wire rope, with a non-reeveable egg-shaped link or eye at each end.
- reeveable single leg/à oeillet coulissant unique. A length of rope with a reeving thimble eye at each end, or with a reeving and an ordinary thimble eye at opposite ends.
- single leg/à brin unique. A length of short link chain or wire rope fitted at one end with a ring and the other end with a hook.
- three leg/à trois brins. Three lengths of short link chain or wire rope, connected to a ring at one end, and each lower end fitted with a hook.
- two leg/à deux brins. Two lengths of short link chain or wire rope, connected at one end to a ring, and each lower end fitted with a hook.

4. forklift truck attachment/accessoire de chariot élévateur

An attachment fitted to the lifting carriage of a forklift truck to enable non standard loads to be lifted. See also boom; broad forks, carton-clamp; chisel forks; clamp; clamp arms; container lifting rig; drum grip; drum forks; end lift beam; finger forks; fork extension sleeves; load guard; load stabiliser; magnetic lifting device; multiple drum clamp; overhead guard; push off; push pull; rotating end lift frame; rotating head; self dumping device; side lift beam; side shift; standard forks; tipping scoop; vacuum lift.

5. spreader beam or frame/cadre de levage

A beam or frame specially designed so that the suspended load is taken vertically from the attachment points, usually over an area.

TEST DATA SHEET

1. TEST EQUIPMENT. Each nation should bring the following equipment, if in their inventory:
 - a. ISO container lifting spreader beam.
 - b. Bridge plate.
 - c. Crane mounted fork attachment.
 - d. Vehicle loading ramp.
2. The following equipment shall be made available at the test site:
 - a. Crane of 10 tonne minimum capacity.
 - b. 20 and/or 40 ft ISO container.
 - c. Category A & Category B forklift trucks.
 - d. Load carrying vehicles.
3. GENERAL. The following is an outline that should be used during an interoperability exercise.
4. OBJECTIVE. The objective of the exercise is to determine if the items being provided, can be used by other nations, than the one supplying the equipment.
5. TEST AREA. The area where the functions are normally carried out.
6. TEST PROCEDURE. Nations are to:
 - a. Take an ISO container from a delivery vehicle and place it upon the ground using the ISO container spreader frame.
 - b. Place the bridge plate into position and then strip (destuff) the container using a Category A or Category B forklift truck and place the pallets upon a hardstanding or improved surface.
 - c. Using the crane mounted fork attachment place the pallets upon a load carrying vehicle.
 - d. Bring the loading ramp from its location by towing and then take the pallets from the load carrier and stuff the container.

e. Record any problems met.

7. DATA COLLECTION TABLE

Nations Task	BEL	FRA	Etc	Etc	Etc	Etc
Container to ground using spreader frame						
Lift and place bridge plate into position / use it.						
Use crane mounted fork attachment.						
Tow vehicle loading ramp into position secure and use it.						

Note: Before using any equipment check the data plate is affixed, its test data certificate is in date and that the materials handling equipment is capable of handling the required load. Slings or any lifting item are to be visually inspected before use.