AU Care, use and maintenance

CERTEX LIFTING

Chain Slings - Grade 80 and Grade 100

Care and Use Manual

Safe use of Grade 80 (T) and Grade 100 (V) Chain (AU)

General
Working with lifting devices and Chain Slings must be planned, organized, and executed to prevent hazardous situations.
In accordance with national statutory regulations, lifting devices and Chain Sling must only be used by a competent person familiar with the work and having theoretical and practical knowledge of safe use.

A competent person must be able to:

1. Assess the mass of the load as accurately as possible.
2. Ensure the load will withstand the lifting operation.
3. Ensure the lifting appliance is rated to lift the load.
4. Select a suitable sling considering the following:
    a. The condition of the sling.
    b. The geometry of the sling includes the number of sling legs and the angles of each sling leg.
    c. Each joining device has no more than one load-bearing component in use at any one time.
    d. The way the load is attached (i.e. straight, reeved or basket configuration).
        i. Including the angle in the reeving.
    e. The shape of the load, the centre of gravity and the load distribution of the sling.
    f. Determination of the WLL.
    g. Protection of the sling from sharp corners and the use of packing material.
    h. The site where the load is to be landed.
    i. Consider environmental conditions such as temperature and corrosive atmospheres.
    j. Identify the hazards involved in the task, conduct a risk assessment, and control those hazards.

Before the Chain Sling is used, the instruction manual must be read as it contains important information about how the Chain Sling will work safely and correctly, and the Chain Sling must be inspected before and after each use. Chain Slings must also be periodically inspected and recorded by a competent person. Guidance on periodic inspections is included in this document.

CERTEX Lifting Chain slings are tested and tagged and are delivered with a CERTEX Lifting Certificate & Declaration of Conformity to AS 3775.2

Use in adverse environments
Grade 80 (T) and Grade 100 (V) Chain Slings should not be used in acidic or alkaline environments as this may cause hydrogen embrittlement, resulting in the failure of the chain sling. The SDS for the solution the chain sling is being exposed to should be checked.

Temperature's effect on working load limit (WLL): Account should be taken to the temperature that can be reached by the chain sling in service. CERTEX LIFTING chain slings in grade 10 can be used in temperatures between-10°C and 200°C without reduction of the workingload limit.

If the chain sling reaches temperatures that exceed the allowed temperatures the Chain Sling should be discarded or returned to CERTEX Lifting for evaluation.

Acidic conditions
Chain slings in grade 80 and grade 100 should not be used either immersed in acidic solutions or exposed to acidic fumes. For the same reason, chain slings should not be hot-dip galvanized or exposed to electrolytic finishing without permission from the manufacturer.

Galvanizing
Chain and fittings must never be hot dipped, mechanically galvanized or electroplated. Hot-dipped galvanized slings must always reduce their working load by 20%.

Chemical Affects
Consult with CERTEX Lifting in case the Chain Slings are exposed to chemicals, especially when combined with high temperatures.

Hazardous Conditions
In particularly hazardous conditions, including offshore activities, lifting of a person, and lifting of potentially dangerous loads such as molten metals, corrosive materials or fissile materials, the degree of hazard should be assessed by a competent person and the working load limit adjusted accordingly.

Heat Conditions
Heat adversely affects the strength of all Chain Slings, so care must be exercised at elevated temperatures. Where temperatures are likely to be higher than 200°C, reductions in the working load limit of CERTEX Lifting chains should be applied. (See table)

Temperature Effects for Grade T

Temperature, °C	Reduction of WLL, %
≥-10 ≥200	Nil
>200 ≥300	10
>300 ≥400	25
>400	Not permissible

Temperature Effects for V400

Temperature, °C	Reduction of WLL, %
≥-10 ≥200	Nil
>200 ≥300	10
>300 ≥380	40
>380	Not permissible

Temperature Effects for V200

Temperature, °C	Reduction of WLL, %
≥-10 ≥200	Nil
>200	Not permissible

Before first use
Before first use of the chain sling, the user should ensure that:

1. The sling is precisely as ordered.
2. A risk assessment is completed if the Chain Sling will be used in a corrosive environment.
3. The manufacturer's Certificate/Declaration of Conformity and User manual is at hand.
4. The identification and working load limit marketing on the sling corresponds to the information on the certificate.
5. Full details of the sling are recorded in a register of slings.

Before each use
Before each use, the chain sling should be inspected for obvious damage or deterioration. If faults are found during this inspection, the procedure given in "Inspection and maintenance" should be followed:

- Ensure the tag is present and legible.
- Ensure periodic inspections have been completed.
- Check the master link for elongation, wear, nicks, cuts, gouges, bending or deformation and corrosive pitting.
- Check chain connectors for elongation, wear, nicks, cuts, gouges, bending or deformation, corrosive pitting and articulation.
- Check chain elongation, wear, nicks, cuts, gouges, bending or deformation and corrosive pitting.
- Check hooks and ensure that there is no excessive hook opening and that the safety catch is fit for use.
- Check hooks for elongation, wear, nicks, cuts, gouges, bending or deformation and corrosive pitting.

If damage is suspected, please tag the sling out of service and return to CERTEX Lifting for inspection, repair and testing.

Choosing the correct chain sling

Mass of the load: It is essential to know the mass of the load to be lifted.

Method of connection: A chain sling is usually attached to the load and the lifting machine by means of terminal fittings such as hooks and links. Chains should always be used without twists or knots. Use the shortening hooks to adjust chain legs that need shortening.

The lifting pointshould be well seated insidethe hook, never on the point or wedged into the opening. The hook should be free to incline in any direction to avoid bending. For the same reason, the master link should be free to incline in any direction on the hook to which it is fitted.

The chain may be passed under or through the load to form a choke hitch or basket hitch. Where it is necessary, due to the danger of the load tilting, to use more than one chain sling leg in a basket hitch. This should preferably be done in conjunction with a lifting beam.

When a chain sling is used in a choke hitch, the chain should be allowed to assume its natural angle and should not be hammered down.

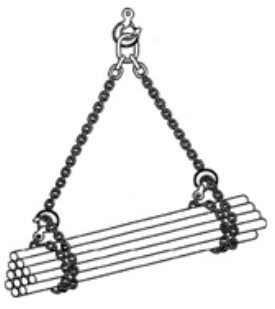
Chain slings may be attached to the load in several ways

Straight leg: In this case, lower terminals are connected directly to the attachment points. Selection of hooks and attachment points should be such that the load is carried in the seat of the hook and tip loading of the hook is avoided. In the case of multi-leg chain slings, hook tips should point outwards unless the hooks are specifically designed to be used otherwise.

Choke hitch: In this case, chain sling legs are passed through or under the load, and the lower terminal back is hooked or reeved onto the chain. This method can, therefore, be used where no suitable attachment points are available and has the additional advantage that the chain sling legs tend to bind the load together. Where a choke hitch is employed, the working load limit (WLL) of the chain sling should be no more than 80% of that marked.

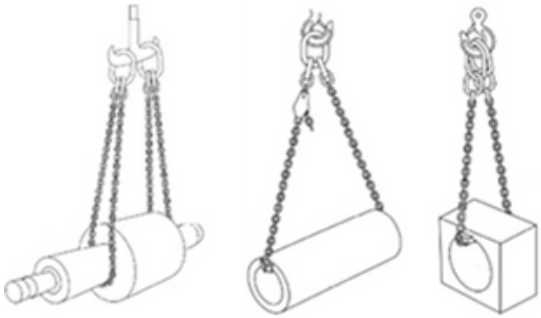
Basket hitch: The chain slings pass through or under the load, and the lower terminals are connected directly to the master link or the lifting machine's hook. Generally, this method requires two or more chain sling legs and should not be used for lifting loads that are not held together. Where the load geometry permits, a single-leg chain sling can be used, provided that the chain sling passes through the load directly above the centre of gravity of the load.

Wrap and choke or wrap and basket hitch: These methods are adaptations of choke hitch and basket hitch, designed to provide extra security for loose bundles and involve taking an extra loop of chain completely around the load. If two or more chain sling legs are used in a choke hitch or a wrap and choke hitch, care should be taken:
a) If it is important to avoid imparting a torque to the load, to align the chokes; or
b) If it is important to avoid the load rolling or moving laterally when first lifted, ensure that at least one leg passes either side of the load.



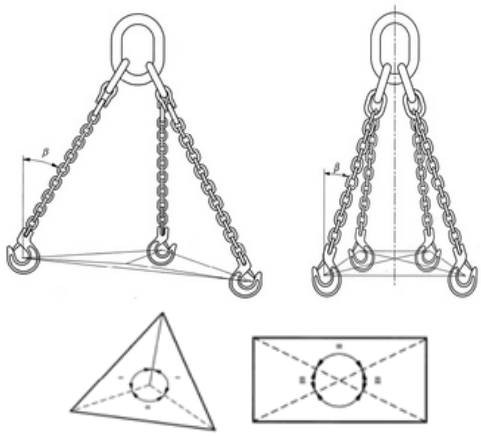
Wrap and choke hitch

Choke hitch



Basket hitch

Symmetry of loading: Working load limits (WLL) for chain slings of different dimensions and configurations have been determined on the basis that the loading of the chain sling is symmetrical. This means that when the load is lifted, the chain sling legs are symmetrically disposed of in plan and subtend the same angles to the vertical. In the case of three-leg chain slings, if the legs are not symmetrically disposed in plan, the greatest tension will be in the leg where the sum of the plan angles to the adjacent legs is greatest. The same ef- fect will occur in 4 leg chain slings except that the rigidity of the load should also be taken into account, with a rigid load the majority of the mass may be taken by only three or even two legs with the remaining leg or legs serving only to balance the load.



In the case of 2-, 3- and 4-leg chain slings, if the legs subtend different angles to the vertical, the greatest tension will be in the leg with the smallest angle to the vertical. In the extreme case, if one leg is vertical, it will carry the entire load.

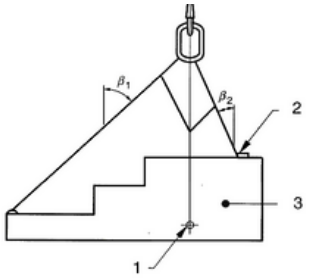
If there is both a lack of symmetry in the plan and unequal angles to the vertical, the two effects will combine and may either be cumulative or tend to negate each other. The loading can be assumed to be symmetric if all of the following conditions are satisfied and the load is less than 80% of marked WLL:

1. Chain sling leg angles to the vertical are all not less than 15°, and the symmetry of loading
2. Chain sling leg angles to the vertical are all within 15° of each other, and
3. In the case of three- and four-leg chain slings, the plan angles are within 15° of each other.

If all of the above parameters are not satisfied, then the loading should be considered as asymmetric and the lift referred to a competent person to establish the safe rating for the chain sling. Alternatively, in the case of asymmetric loading, the chain sling should be rated at half the marked WLL.

If the load tends to tilt, it should be lowered, and the attachments changed. This can be accomplished by re-positioning, the attachment points or using compatible shortening devices in one or more of the legs. Such shortening devices should be used in accordance with CERTEX Lifting's instructions

Centre of gravity: It is assumed that the attachment point of the hook is directly above the centre of gravity of the load. The position of the load's centre of gravity in relation to all attachment points for the chain sling should be established. To lift the load without rotation or overturning, the following conditions should be met:
a) The attachment point should be vertically above the centre of gravity for single-leg and single-endless slings.
b) For 2-leg slings, the attachment points should be on either side of and above the centre of gravity. For 3- and 4-leg slings, the attachment points are distributed in a plan around the center of gravity. It is preferable that the distribution should be equal and that the attachment points are above the centre of gravity.



1. Centre of gravity
2. High tension in this leg
3. Load P

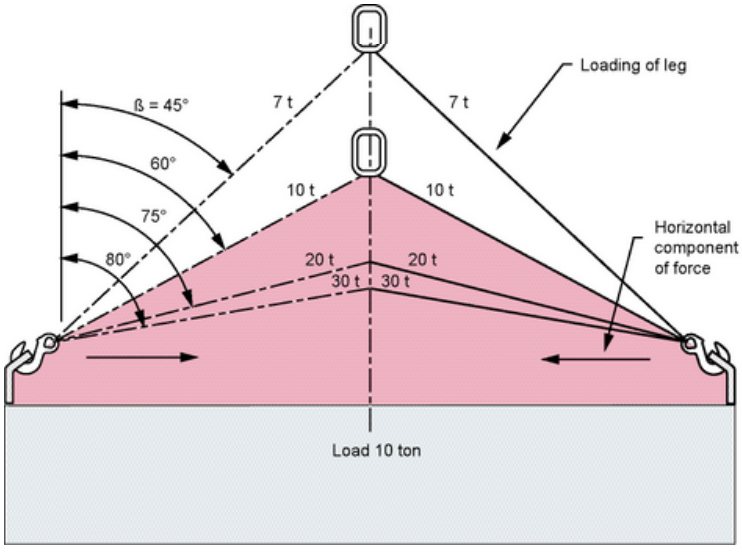
When using 2-, 3- and 4-leg slings, the attachment points and sling configuration should be selected to achieve an angle between the sling's legs and the vertical within the range marked on the sling. Preferably all angles to the vertical angle (angle β) should be equal. Anglesto the vertical of less than 15° should be avoided as they present a significantly greater risk of load imbalance.

Horizontal Forces

All multi-leg slings exert a horizontal component of force (see figure) which increases as the leg angle to the vertical increases. As a result of this, the leg angle should never exceed 60°. Care should always be taken to ensure that the load to be moved is able to resist the horizontal component of force without being damaged.

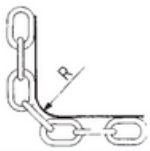
How the load of sling leg changes according to the vertical angle for a 10 ton load.

The red area indicates angles greater than 60° for which slings are not intended to be used.



Reduction of WLL due to sharp edges

It is important to protect the chain links from damages from sharp edges. If proper padding can't be used the WLL of the sling needs to be reduced according to the reduction table below.

Edge load effect on WLL	R = larger than 2 x chain Ø	R = larger than chain Ø	R = chain Ø or smaller
			
Load factor	1 x WLL	0,7 x WLL	0,5 x WLL

Working load limit (WLL) of the chain sling

Considering the recommendations and the cumulative effects of de-rating, the method of slinging should be decided, and a suitable chain sling should be selected so that the mass to be lifted does not exceed the WLL of the sling.

Load Diagram

Grade 80 (T) Chain Slings

SPECIFICATIONS

Chain Size (mm)	WORKING LOAD LIMIT (TONNES)								
	SINGLE LEG SLINGS				SLINGS OF 2, 3 OR 4 LEGS				2 LEG SLINGS
	 Straight or Adj. Sling No Deration	 Adj. Sling with Deration	 Reeved Sling	 Basket Sling Max 60°	 Straight Sling 60°	90°	120°	 Reeved Sling Max 60°	 Basket Sling Max 60°
Loading factors	1	0.75	0.75	1.3	1.73	1.41	1	1.3	2.25
6	1.1	0.8	0.8	1.5	1.9	1.6	1.1	1.5	2.5
7	1.5	1.1	1.1	2	2.6	2.1	1.5	2	3.4
8	2	1.5	1.5	2.6	3.5	2.8	2	2.6	4.5
10	3.2	2.4	2.4	4.1	5.5	4.5	3.2	4.1	7.2
13	5.3	4.0	4.0	6.9	9.2	7.5	5.3	6.9	11.9
16	8	6.0	6.0	10.4	13.8	11.3	8	10.4	18.0
19	11.2	8.4	8.4	14.6	19.4	15.8	11.2	14.6	25.2
20	12.5	9.4	9.4	16.3	21.6	17.6	12.5	16.3	28.1
22	15	11.3	11.3	19.5	26.0	21.2	15	19.5	33.8
26	21.2	15.9	15.9	27.6	36.7	29.9	21.2	27.6	47.7
32	31.5	23.6	23.6	41	54.5	44.4	31.5	41	70.9

Grade 100 (V) Chain Slings

SPECIFICATIONS

Chain Size (mm)	WORKING LOAD LIMIT (TONNES)								
	SINGLE LEG SLINGS				SLINGS OF 2, 3 OR 4 LEGS				2 LEG SLINGS
	Straight or Adj. Sling No Deration	Adj. Sling with Deration	 Reeved Sling	 Basket Sling Max 60°	 Straight Sling 60°	90°	120°	 Reeved Sling Max 60°	 Basket Sling Max 60°
Loading factors	1	0.75	0.75	1.3	1.73	1.41	1	1.3	2.25
4	0.63	0.5	0.5	0.8	1.1	0.9	0.63	0.8	1.4
5	1	0.8	0.8	1.3	1.7	1.4	1	1.3	2.3
6	1.4	1.1	1.1	1.8	2.4	2.0	1.4	1.8	3.2
7	1.9	1.4	1.4	2.5	3.3	2.7	1.9	2.5	4.3
8	2.5	1.9	1.9	3.3	4.3	3.5	2.5	3.3	5.6
10	4	3.0	3.0	5.2	6.9	5.6	4	5.2	9.0
13	6.7	5.0	5.0	8.7	11.6	9.4	6.7	8.7	15.1
16	10	7.5	7.5	13.0	17.3	14.1	10	13.0	22.5
18	12.5	9.4	9.4	16.3	21.6	17.6	12.5	16.3	28.1
19	14	10.5	10.5	18.2	24.2	19.7	14	18.2	31.5
20	16	12.0	12.0	20.8	27.7	22.6	16	20.8	36.0
22	19	14.3	14.3	24.7	32.9	26.8	19	24.7	42.8
23	21	15.8	15.8	27.3	36.3	29.6	21	27.3	47.3
26	26.5	19.9	19.9	34.5	45.8	37.4	26.5	34.5	59.6
28	31.5	23.6	23.6	41.0	54.5	44.4	31.5	41.0	70.9
32	40	30.0	30.0	52.0	69.2	56.4	40	52.0	90.0

Multi-leg chain slings with less than the full number of legs in use

Occasions may arise when a lift needs to be made using fewer legs than the number of legs in the chain sling. Legs not in use should be hooked back to reduce the risk of such legs swinging freely or snagging when the load is moved.

Preparation: Before starting the lift, it should be ensured that the load is free to move and is not bolted down or otherwise obstructed.

Protection may be required where a chain comes into contact with a load to protect either the chain or the load or both since sharp corners of hard material may bend or damage the chain links, or conversely, the chain may damage the load because of high contact pressure. Corner protection should be used to prevent such damage.

A tagline is recommended to prevent dangerous swaying of the load and position it for loading.

When loads are accelerated or decelerated suddenly, dynamic forces increase the stresses in the chain. Such situations, which should be avoided, arise from snatch or shock loading. from not taking up the slackchain before starting to lift or because of the shock from the falling load being stopped.

Safety when lifting: Hands and other body parts should be kept from the chain sling to prevent injury as the slack is removed. The slack should be taken when ready to lift until the chain is taut. The load should be raised slightly, and a check should be made to ensure it is secure and assumes the intended position. Lifting personnel must be aware of the risks of swinging and tilting loads. This is especially important with baskets and other loose hitches where friction retains the load. Never allow persons or body parts under hanging load. Do not allow persons to ride on the load while the load is being lifted.

Landing the load: The landing site should be well prepared.It should be ensured that the ground floor is of adequate strength to take the load, considering any voids, ducts, pipes, etc., which may be damaged or collapsed. Ensure adequate access to the site and clear of any unnecessary obstacles and people. It is preferable to use timber bearers or similar material to avoid trapping the sling to protect the floor or load or ensure the stability of the load when landing.

The load should be landed carefully, ensuring that hands and feet are kept clear. Care should be taken to avoid trapping the chain sling beneath the load, which may damage the sling. Before allowing the chain to become slack, the load should be checked to ensure it is properly supported and stable. This is especially important when several loose objects are lifted in basket hitch and choke hitch.

When the load is safely landed, the chain slings should be carefully removed to avoid damage, snagging, or causing the load to topple over. The load should not be rolled off the slings. This may damage the sling.

Storage of chain slings: When not in use, chain slings should normally be kept on a properly designed rack. They should not be left lying on the ground where they may be damaged. If the chain slings are left suspended from a crane hook, the sling hooks should be engaged in the master link to reduce the risk of sling legs swinging freely or snagging. If it is likely that the slings will be out of use for some time, they should be cleaned, dried, and protected from corrosion, e.g., lightly oiled.

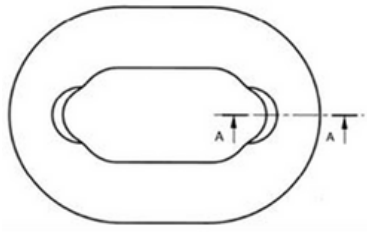
Inspection and maintenance

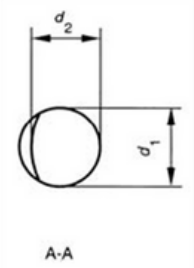
Examination: During service, chain slings are subjected to conditions that may affect their safety.It is necessary, therefore, to ensure, as far as is reasonably practicable, that the sling is safe for continued use.

If the tag or label identifying the chain sling and its working load limit becomes detached and the necessary information is not marked on the master link or by some other means; the chain sling should be withdrawn from service.

The sling should be withdrawn from service and referred to a competent person for thorough examination if any of the following is observed before each use:

1. Illegible sling markings, i.e. sling identification and/or working load limit.
2. The upper or lower terminal fitting has deformed.
3. The chain has been overloaded. If the chain slings have extended, if free rotation between the links is missing or if there is a noticeable difference in length between legs in a multi-leg sling, the reason can be that the chain has been overloaded.
4. Wear by contact with other objects usually occurs outside the straight portions of the links where it is easily seen and measured. Wear between adjoining links is hidden. The chain should be slack, and adjoining links should be rotated to expose the inner end of each link. Inter-link wear (in the bearing points) is tolerated until the mean value of two measured values 90° against each other has been reduced to 90% of the nominal diameter.
5. Cuts, nicks, gouges, cracks, excessive corrosion, heat discolouration, bent or distorted links, or other defects.
6. Signs of “openingout” of hooks,i.e. any noticeable increase in the throat openings or any other form of distortion in the lower terminal. The increase in throat opening should not exceed 10% of the nominal value or be such as to allow the safety latch, if fitted, to become disengaged.





Periodic Inspection: A thorough examination should be carried out by a competent person at intervals not exceeding twelve months. This interval should be less where deemed necessary in the light of service conditions, CERTEX Lifting recommends quarterly inspections for Chain Slings got general frequent use. Records of such examinations should be maintained.

Number of Lift Cycles per Week	Inspection Monthly	Inspection 3 Monthly	Inspection 6 Monthly	Inspection 12 Monthly
1 to 5	-	-	-	Yes
6 to 25	-	-	Yes	-
26 to 200	-	Yes	-	-
201+	Yes	-	-	-

NOTE: The above is a guide, and the end-user must determine the inspection schedule based on the duty cycle (of M3 as specified in AS 1418.1) and the environmental conditions of use.

Before examination, chain slings should be thoroughly cleaned to be free from oil, dirt and rust. Any cleaning method that does not damage the parent metal is acceptable. Methods to avoid are those using acids, overheating, removal of metal or movement of metal, which may cover cracks or surface defects.

Adequate lighting should be provided, and the chain sling should be examined throughout its length to detect any evidence of wear, distortion or external damage.

Repair: Any replacement component or part of the chain sling should be per the appropriate Australian Standard for that component or part. Use only original spare parts.

If any chain link within the leg of a chain sling must be replaced, then the whole length of the chain leg should be renewed. The repair of the chain in a welded chain sling should only be done by the manufacturer. Components that are cracked, visibly distorted or twisted, severely corroded or have deposits that cannot be removed should be discarded and replaced.

Minor damage, such as nicks and gouges, may be removed by careful grinding or filing. The surface should blend smoothly into the adjacent-trial without abrupt section change. The complete removal of the damage should not reduce the thickness of the section at that point to less than the manufacturer's specified minimum dimensions or by more than 10% of the nominal thickness of the section.

In the case of chain slings on which repair work has involved welding, each repaired chain sling should be proof load tested following heat treatment using a force equivalent to twice the working load limit and thoroughly examined before it is returned to use. However, where repair is carried out by inserting a mechanically assembled component, proof-testing is not required, as the manufacturer has already tested the component under the relevant Australian standard.

End of Use/Disposal

Chain sling shall always be sorted/scrapped as general steel scrap. CERTEX LIFTING will assist you with the disposal, if required.

Management System

Our asset management systems are ideal for managing a single asset or large Chain Sling portfolio across multiple sites. Designed to deliver optimum asset integrity, quality assurance and traceability, the system also improves safety and risk management.

User Manuals

You can always find the valid and updated User Manuals on the web. The manual is updated continuously and valid only in the latest version.

The manual is available as a download under the following link:
www.certexlifting.com.au/manuals

Product compliance and conformity
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