Climbing Gym Meeting2025

Critical incidents, accidents, risks, and recommendations from the DAV for auto belay devices

Halls & Walls 22.11.2025, Lorenz Berker, Dr. Tanja Ganz – sifo@alpenverein.de

Auto Belay

- Auto belays in climbing gyms have become mainstream in recent years.
- They are becoming increasingly popular
  - over 50% of climbers use them regularly
    (*survey in DAV climbing gyms 2024, n=8630)*
- Estimated number of auto belays in climbing gyms (Germany) ca. 700-1000

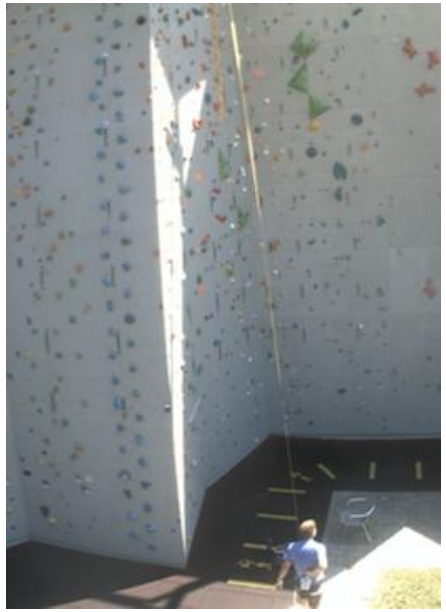
DAV/Marisa Koch

Problem: unsecured climbing on auto belay routes

Video showing an incident of failing to clip in:

- Auto belay at the outdoor area is attached on a rail system.
- After climbing, the person takes a break and attaches the carabiner to his backpack.
- After the break, the person comes back to the climbing wall, chalking hands and looking at the climbing wall.
- The person starts climbing without being clipped in.
- The person falls and got seriously injured.

Quelle: DAV

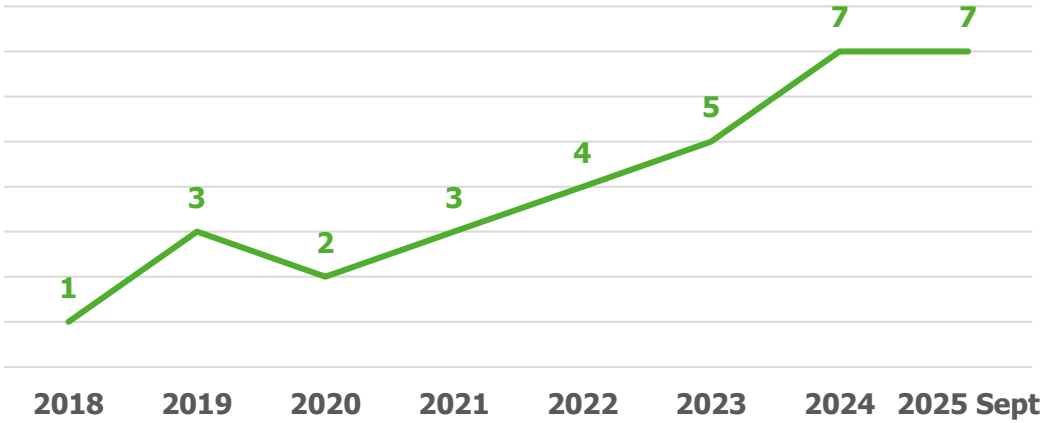


seriously injured

Serious accidents due to failing to clip in*

Deutscher Alpenverein
Sicherheitsforschung

The incident shown is not an isolated case. The accidents reported to the DAV, KLEVER (climbing gym association) and ÖAV (Austrian Alpin Club) show increasing numbers in recent years. This increase certainly runs parallel to the increased purchase and use of auto belays, but it is nevertheless alarming. We have not observed a comparable, such frequent accident pattern with serious consequences since climbing gyms exist.



Result:

- 32 seriously injured
- of these **7 fatally** †

***in Germany and Austria**

Failing to clip in at auto belays

examples of accidents

Accidents at Speed-Routes

Foto: Lukas Schaller

Auto belays on a rail systems allow climbing at the whole climbing wall

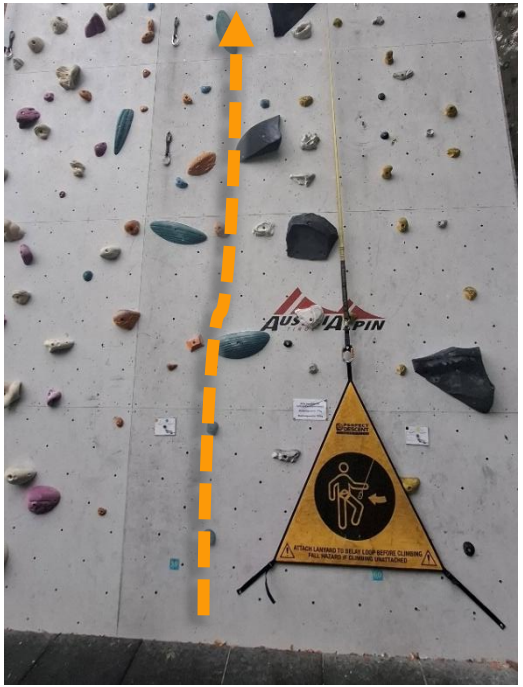
→ Fatal accident (64 aged)

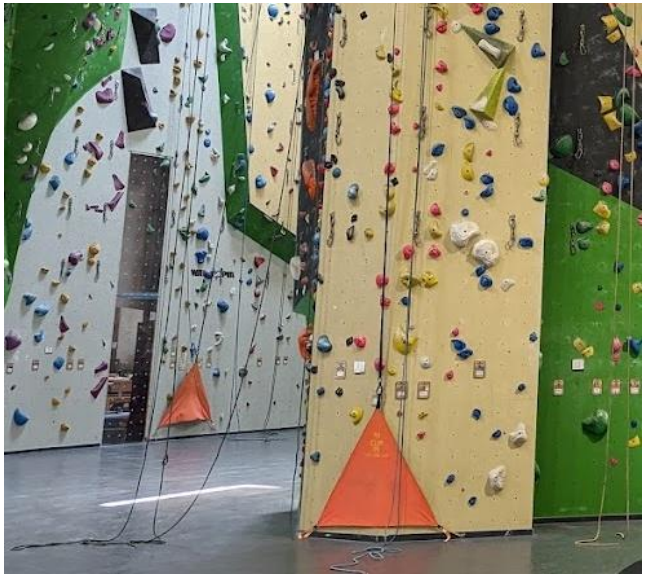
Failing to clip in at auto belays

examples of accidents

→ Entering at the edge or between belay gates

Climber started to climb the route next to the auto belay failing to clip in. The grade was close to her personal limit and she fell at a hight of 4,5 m. It was supposed to be the last route, she had already packed the climbing belt into her backpack.



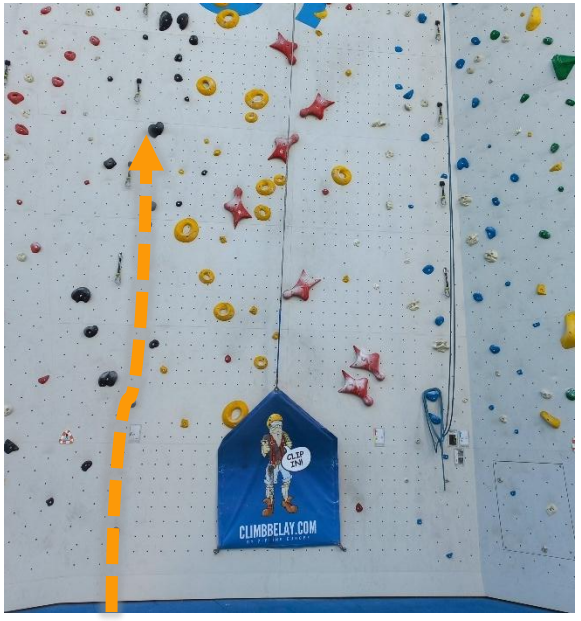


Failing to clip in at auto belays

examples of accidents

→ Entering at the edge or between belay gates

Climber climbed one time with auto belay, then talked with another climber about a climbing route. For the 2nd climb climber entered the route between the belay gates failing to clip in.



Climber started after a short break to climb the route next to the auto belay failing to clip in. At the time of the accident there was a top rope installed at the line.

Failing to clip in at auto belays

People involved in accidents are

- young or old
- have little or many years of climbing experience
- are male or female

How does this happen?

- Often alone
- Wearing headphones and not hearing warnings from those present
- Carelessness during routine procedures
- No partner check

Failing to clip in at auto belays

- Failing to clip in is happening as shown by accident data and reports of near accidents
- People climb in climbing gyms with personal responsibility. However the DAV wonders **is it possible to create an environment that minimizes risks**?

→ **Technical measures**

→ **Warning systems ?!**

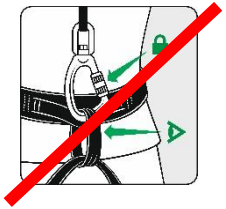
In order to decide which measures could be effective, the DAV had to get an overview of the current situation in climbing gyms:

- Understanding the usage concept
- Obtaining information about accidents, near accidents and incidents with auto belays
- Deriving specifications for the setup pf warning systems

Survey among climbing gym operators, March 2025

Feedback from
74 climbing gyms with
341 autobelays

Accidents



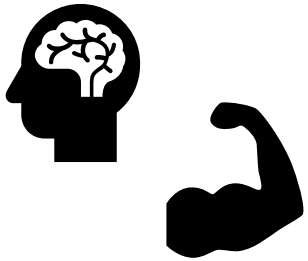
- **104** accidents, near accidents, incidents **with auto belays**, of these:
  - **82 %** accidents, near accidents* due to **failing to clip in**
  - **19 %** accidents, near accidents, incidents due to other reasons/accident patterns (collision, equipment failure etc.)

- 35 climbing gyms (47 %) with 62 % of the auto belays report accidents, near accidents* due to failing to clip in

* in the following text: near-/accidents

Requirements for use

introductory video



knowledge

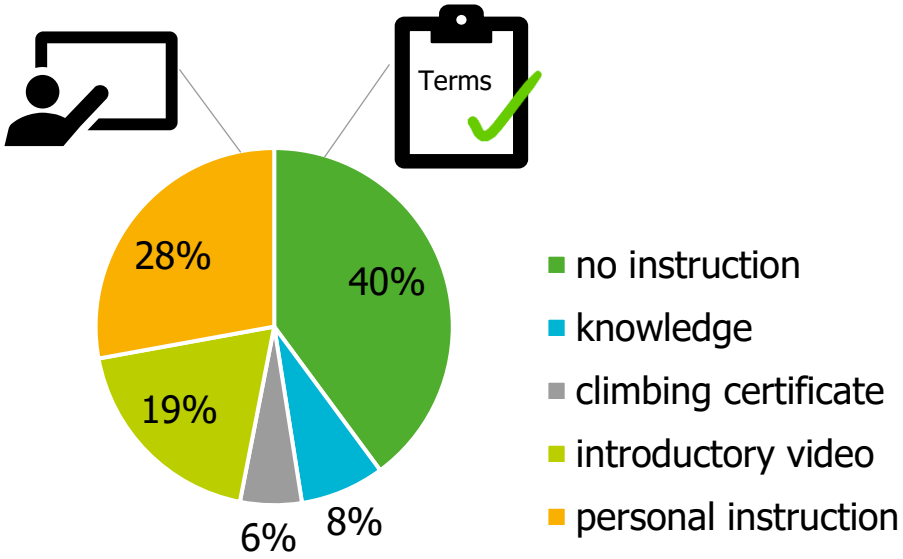
Personal instruction

climbing certificate

No requirements (unless General Terms and Conditions)

Requirements for the use of auto belays

A look at the biggest opposites "nothing" vs. "personal instruction"



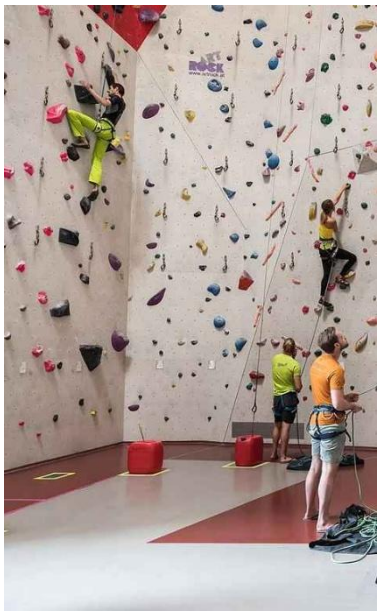
Requirements at reported near-/accidents:
44 % „no requirements"
41 % „personal instruction"

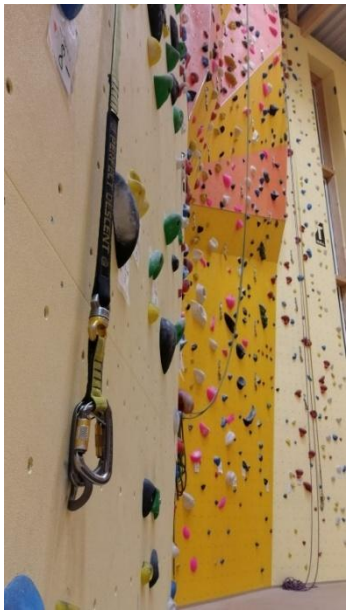
The conclusion that personal instruction is accident-prone is hardly accurate.

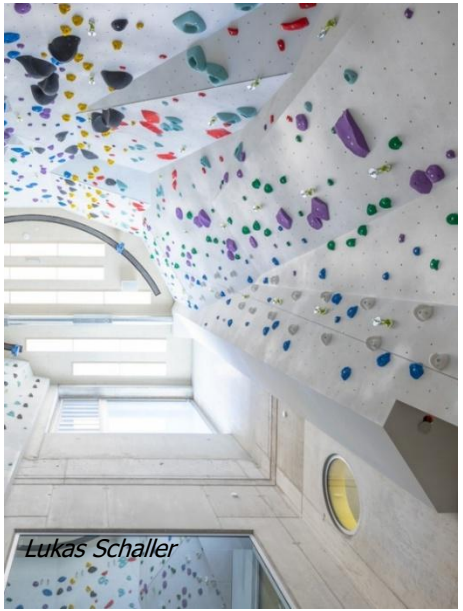
Operating situation at climbing gyms

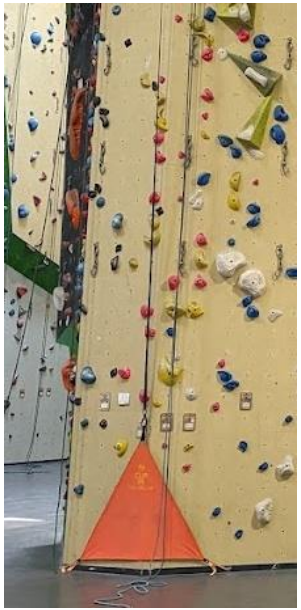
Mixed operation: auto belay lines are also equipped for top rope or lead climbing

Near-/accidents don't happen due to lack of knowledge but of attention. Is it possible to influence the attention to clip in by the usage concept? How does the operation situation at the climbing gyms look like?









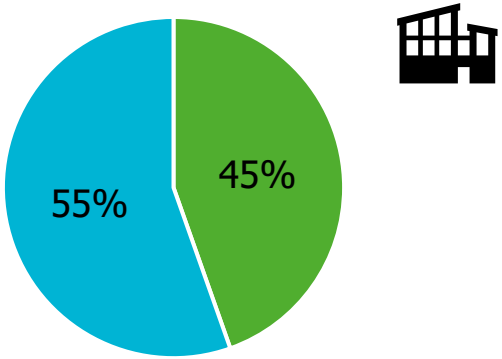
Examples: Carabiner hanging sideways or backwards without gate, auto belay on rail, auto belay and top rope

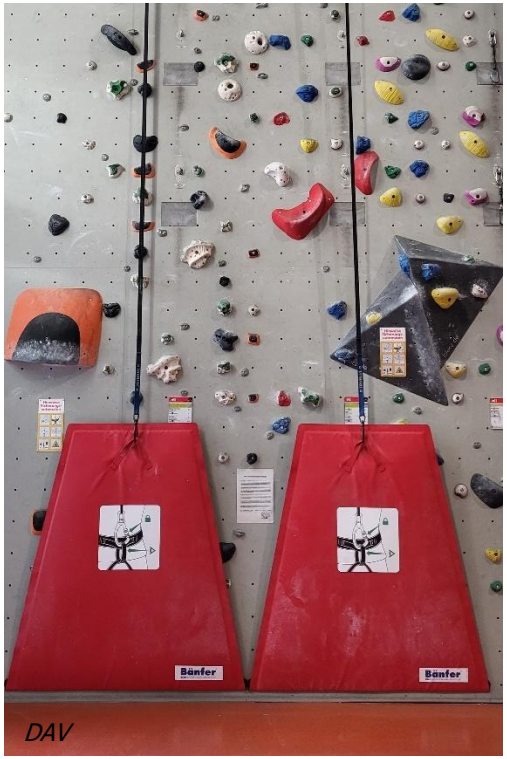
Operating situation at climbing gyms

Mixed operation vs. pure auto belay lines

Situation at Climbing Gym

showing the attitude of the climbing gym manager





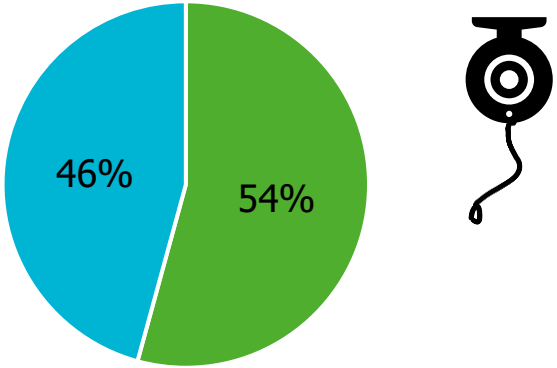
pure auto belay lines

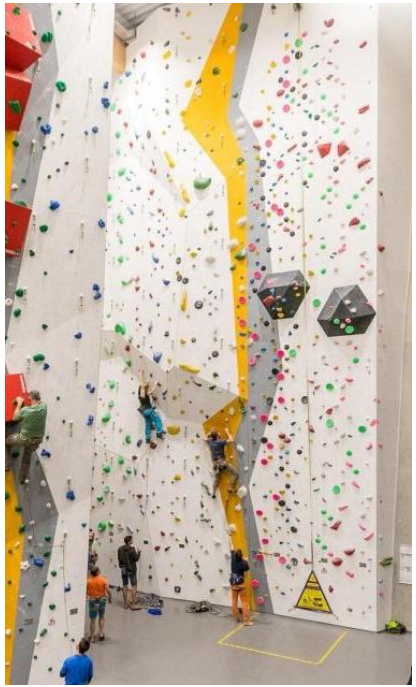
Operating situation of the auto belay lines

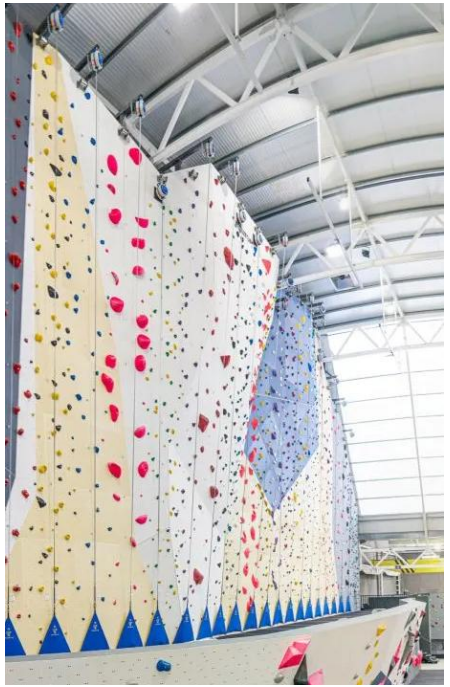
Mixed operation vs. pure auto belay lines

Situation of Auto Belay Lines

as climbing gyms have different numbers of auto belays

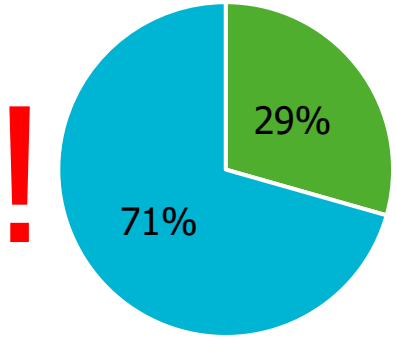






Evaluation of feedback on near-/accidents

Near-/accidents due to failing to clip in



- near-/accidents due to failing to clip in - climbing gyms without mixed operation
- near-/accidents due to failing to clip in - climbing gyms with mixed operation

status quo at time of survey

55 % climbing gyms with mixed operation

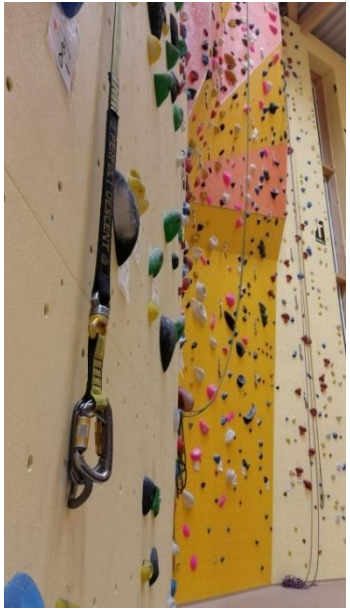
46 % auto belay lines with mixed operation

Significantly more incidents with auto belay with mixed operation

Note: The responses in the survey do not indicate whether the type of operation was modified after a near-/accident.

Layout of the belay gate as a preventive measure

Belay gates should prevent persons to start climbing failing to clip in. The lower climbing holds have to be completely covered by the belay gate.



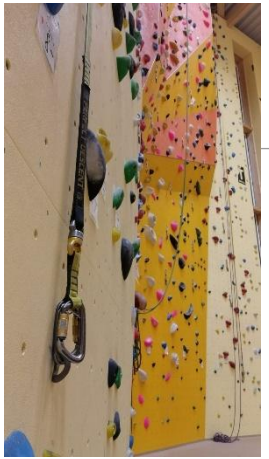
no belay gate

triangular cloth

trapezoidal or other large mat

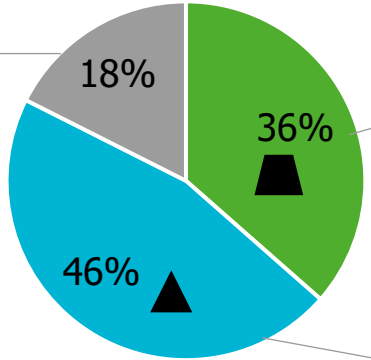
big selfmade belay gate

Situation of route access at climbing gyms



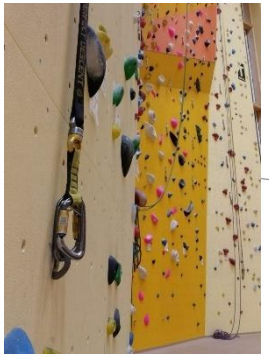
Type of belay gates at the climbing gym

showing the attitude of
the climbing gym manager



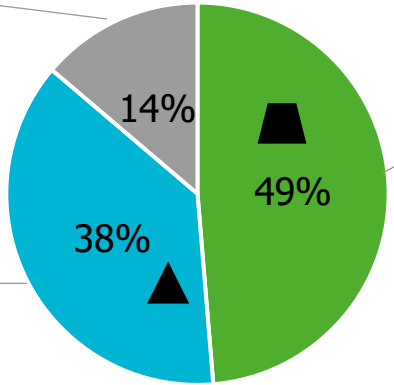
Note: In the case of a climbing gym having different types of belay gates, the most unfavourable (=accident-prone) type was chosen for evaluation.

Situation of route access of the auto belay lines



Type of Belay Gates per Auto Belay Line

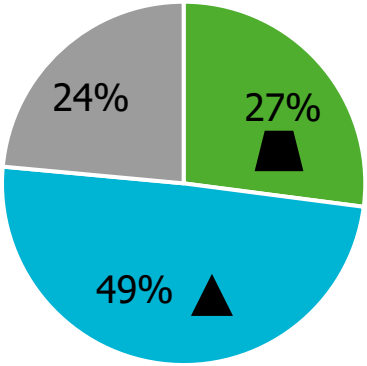
as climbing gyms have different numbers of auto belays



Note: In the case of a climbing gym having different types of belay gates, the most unfavourable (=accident-prone) type was chosen for all auto belay devices for evaluation.

Evaluation of feedback on near-/accidents

Near-/accidents due to failing to clip in



- near-/accidents due to failing to clip in - trapezoidal mat
- near-/accidents due to failing to clip in - triangular cloth
- near-/accidents due to failing to clip in - no belay gate

Type of Belay Gates per Auto Belay Line

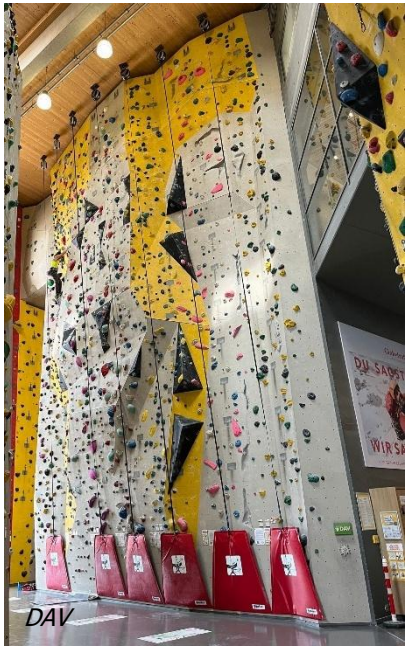
49 %
38 %
14 % no belay gate

Prevention of failing to clip in

trapezoidal mat > triangular cloth > no belay gate

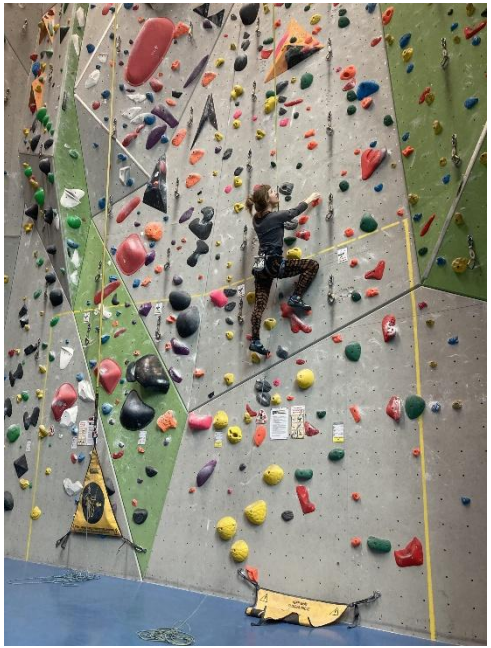
Two responses in the survey stated a change of the belay gate after an accident.

Positioning of the Auto Belay Lines in the Climbing Wall Area



pure auto belay area

at the edge

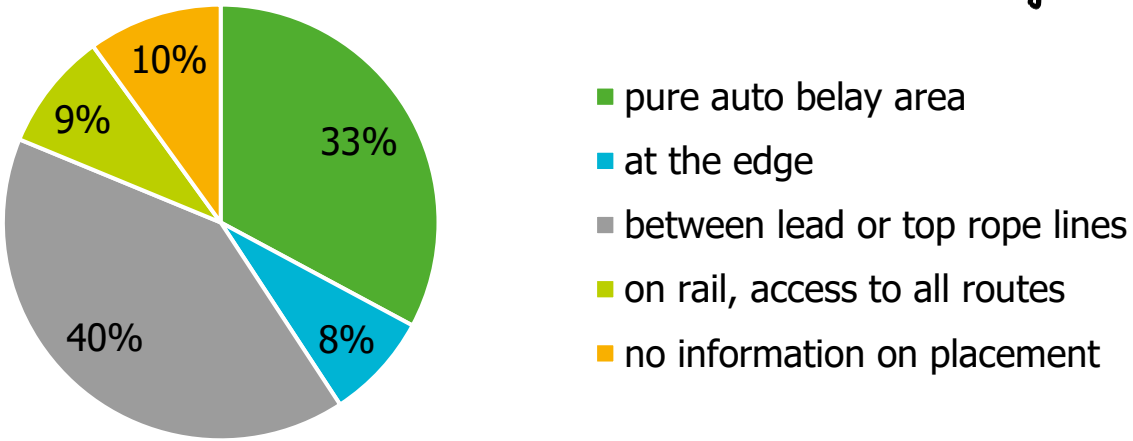


between lead or top rope lines

on a rail, access to all routes

Positioning of the Auto Belay Lines in the Climbing Wall Area

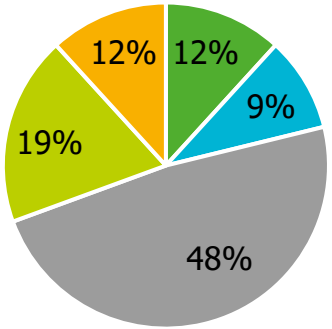
Positioning per Auto Belay Line
(most unfavourable setup)



Note: In the case of a climbing gym having different setups for the auto belay lines, the most unfavourable (=accident-prone) setup was chosen for all auto belay devices for evaluation.

Evaluation of feedback on near-/accidents

Near-/accidents due to failing to clip in per positioning
(most unfavourable setup)



- near-/accidents due to failing to clip in - pure auto belay area
- near-/accidents due to failing to clip in - at the edge
- near-/accidents due to failing to clip in - between lead or top rope lines
- near-/accidents due to failing to clip in - on rail, access to all routes
- near-/accidents due to failing to clip in - no information on placement

Type of Positioning per Auto Belay Line
33% pure auto belay area
40% between lead or top rope lines
9% on rail, access to all routes

Evaluation of feedback on near-/accidents

Near-/accident clusters when placing

- on a rail
- between lead and top rope routes

Few, but unfortunately still some near-/accidents in

- pure auto belay areas

The responses in the survey do not indicate whether the setup was modified after a near-/accident.

Conclusion from the survey results

Main cause of accidents involving auto belays: **failing to clip in**

Accident-prone arrangement of auto belays:

- **Mixed operation** with top rope or lead climbing (mounted on rails)
- A small belay gate or no one at all
- Placement between lead or top rope routes

The findings of the survey prove the DAV recommendations.

Auto Belays: Recommendations for Climbing Gyms

Responsibility of climbing gym operators

- Installation and customized route setting
- Regular inspection and maintenance
- Instruction and information on use for users
- Accident prevention and handling of cases of failing to clip in

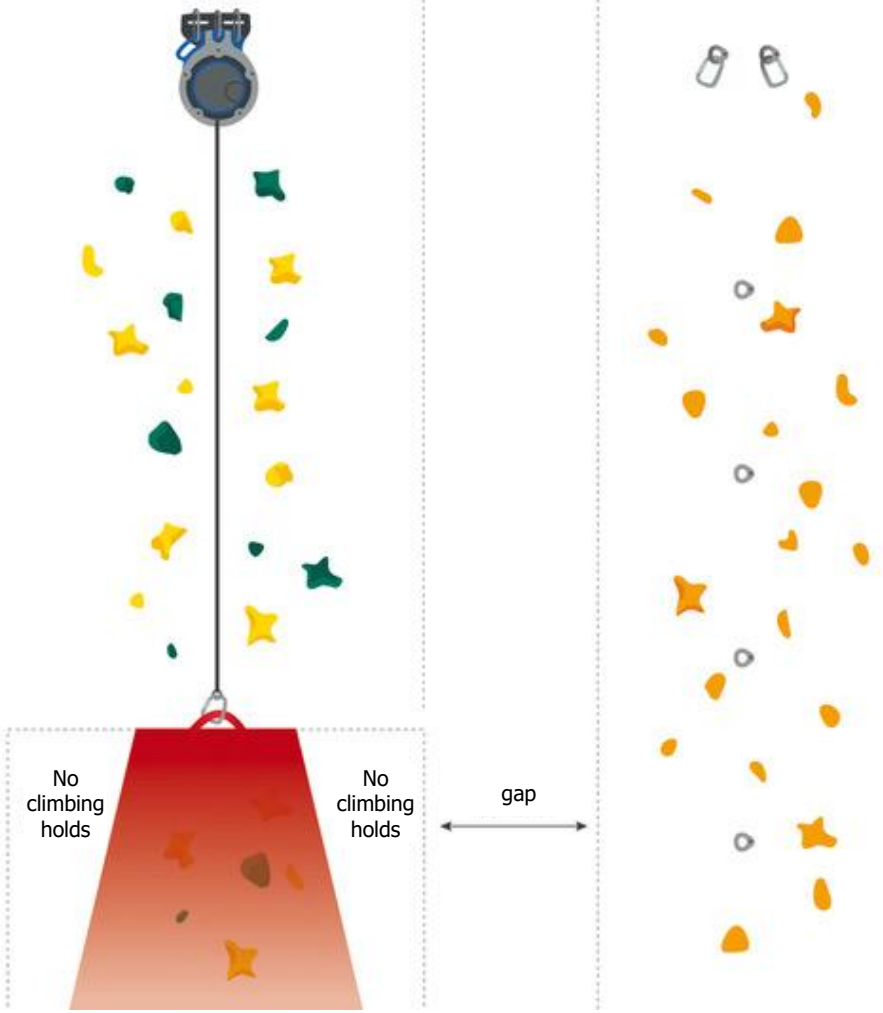
learn more

Recommendations for Climbing Gyms and Route Setting

- Separation of top rope and lead climbing lines at the route access
- Large scale belay gate

Route Setting

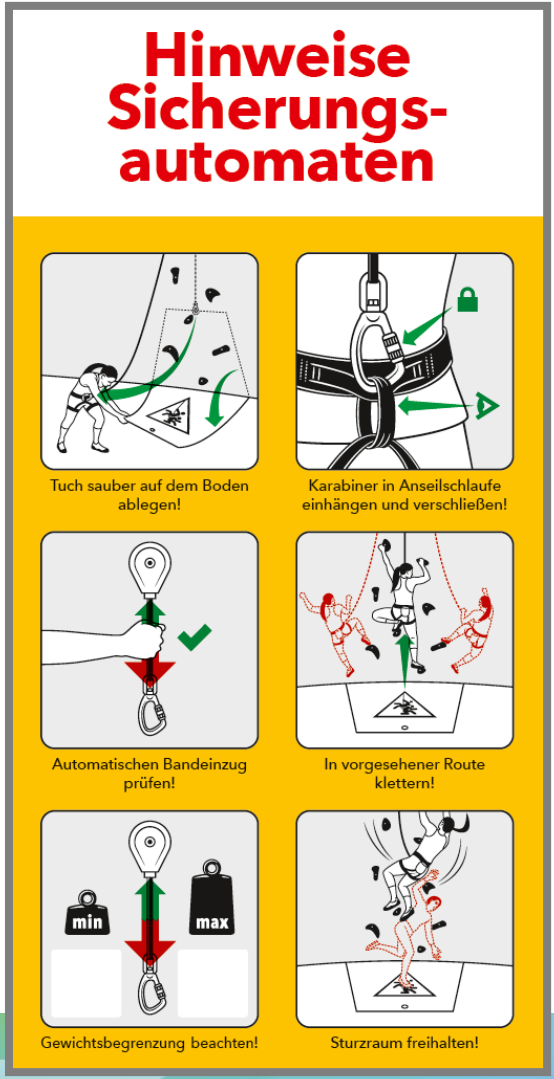
- All starting holds should be covered.
- It should be impossible to climb above the device.
- Be careful with volumes and large holds/macros: the auto belay belt should not rub against them (damage to the edges of the strap)!
- Route setting without long pendulum falls!



Guidelines for Climbers

- At least a placard with instructions for use
- Instruction for correct use and in case of a defect device: personal or per video
- During personal instruction or as part of courses: Explicit reference to the cause of accidents due to “failing to clip in”
- If available: provide a rescue kit and instruct the use of it

Rescue Kit der Verbund Kletterhallen München



Technical Measures for Preventing Accidents due to Failing to Clip in

In principle, the DAV prefers personal responsibility instead of technical solutions. But the situation of accidents is developing in a manner that we have to look for a preventing measures. A few manufacturers already started to develop audio-visual warning systems in recent years which will be presented later.

The DAV has also considered what requirements such an alarm system should meet:

Requirements for alarm systems

Primary

- Alarm when an unsecured climber is on the line.
- Reliable, fast response
- Clear audio and visual warning
- Few false alarms
- Edge areas can be adjusted
- Can be integrated into existing lines
- Affordable

Secondary

- Alarm if a person is not clipped in and is "climbing afterwards"
- Alarm if a person is clipped in incorrectly
- Alarm if the carabiner is not clipped in in the right place after climbing

Audio-visual Warning Systems

Manufacturer:

- Clift Climb Sentry
- IPF electronic Belay Check
- MBS Industry B.A.S.S.
- ProARMOUR ProGrade
- Lizcore Safety Gate
- Headrush True Alert
- Walltopia SmartGate
- Nicros abss (USA)
- JK Tech AutobelayAlarm (Slovenia)

Installed and tested in DAV climbing gyms

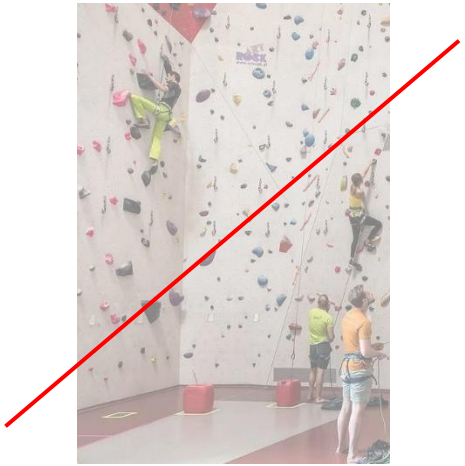
Warning Systems: Future Standard?

Alarm systems are on or about to be launched on the market!
Test phase (effectiveness, sensitivity, false alarms, etc.)

Note: Alarm systems have not yet become established. Climbing gym operators should keep themselves informed about developments of alarm systems. It has been shown that checking a climber being clipped in at a pure auto belay line can be done quite easy with various systems. From the test phases, we know that problems arise when the monitoring system has to correctly classify the use of neighboring lines or even simultaneous lead climbing on auto belay lines (e.g., when device is mounted on a rail).

Requirement for most alarm systems:
No mixed operation!

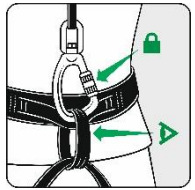
!

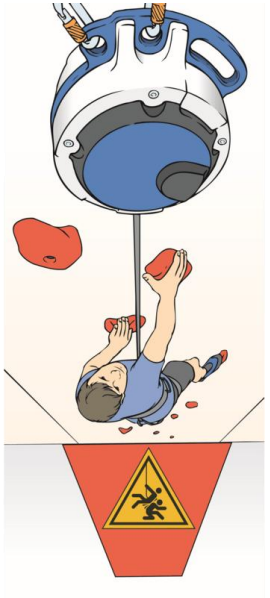


Still important!

Awareness raising among **operators**:
well-thought-out concepts, route construction, measures

Awareness raising among **climbers**:
Education and establishment of self-checking





Note: Ideally, a uniform concept for climbing on auto belay will be established in climbing gyms to prevent failing of clip in. Despite all the preventing measures the personal responsibility plays a important role at (indoor) climbing.

Climbing Gym Meeting2025