
Workplace Health and Safety Bulletin



Travelling, Standing and Working on Ice Requires Extreme Caution

How to calculate effective thickness

The effective thickness of a base of clear, blue ice plus white ice or snow ice is a thickness of clear, blue ice of equivalent load bearing strength. The formula to calculate total effective ice thickness is:

$$T \text{ Clear} + \frac{1}{2} T \text{ White} = T \text{ Effective}$$

Example: 400 millimetres of clear ice plus 200 millimetres of snow ice
= 400 millimetres clear + $\frac{1}{2}$ of 200 millimetres of snow ice
= 500 millimetres effective

Where water lies between layers, use only the dept of the top layer of ice.

Temperature variations

Daily air temperatures must be constant over a given period so that ice thickness will withstand the permissible loads as outlined in the Table 1 and 2.

Table 1 Ice strength for continuous travel

This table is for clear, blue ice on lakes and on rivers. This table does not apply for parked loads, or where ice faults are evident.

| Permissible load (clear, blue ice) | Effective Ice Thickness in Millimetres | |
|---------------------------------------|---|-------|
| | Lake | River |
| One person on foot | 50 | 60 |
| Group, in single file | 80 | 90 |
| Passenger car 2000 kilograms | 180 | 210 |
| Light truck 2500 kilograms | 200 | 230 |
| Medium truck 3500 kilograms | 260 | 300 |
| Heavy truck 7000 to 8000 kilograms | 350 | 410 |
| 10,000 kilograms | 380 | 440 |
| 25,000 kilograms | 630 | 730 |
| 45,000 kilograms | 800 | 920 |
| 70,000 kilograms | 1000 | 1150 |
| 110,000 | 1250 | 1440 |

This table is intended to provide general guidance only

Table 2 Ice strength for stationary loads and working on ice

This table is for clear, blue ice on lakes and rivers. This table applies to loads to be stationary on ice for more than two hours.

| Permissible load (clear, blue ice) | Effective Ice Thickness in Millimetres | |
|---------------------------------------|---|-------|
| | Lake | River |
| 1,000 kilograms | 200 | 230 |
| 2,000 kilograms | 300 | 350 |
| 4,000 kilograms | 450 | 520 |
| 8,000 kilograms | 600 | 690 |
| 25,000 kilograms | 1100 | 1270 |
| 45,000 kilograms | 1500 | 1730 |
| 70,000 kilograms | 1800 | 2070 |
| 110,000 kilograms | 2300 | 2650 |

This table is intended to provide general guidance only

When ice is

- Less than 500 millimetres thick, temperature must be constant for three days.
- Between 500 and 1000 millimetres thick, temperature must be constant for four days.
- Over 1000 millimetres thick, temperature must be constant for five days.

During a sudden drop in temperature and for three to five days following such a decline, the minimum ice thickness should be adjusted. If the temperature drop is excessive, severe thermal stressing or cracking of the ice will require caution and temporary load restrictions.

If drop is

- 5 percent or less — multiply 1.4 x minimum ice thickness
- 5 to 10 percent — multiply 2.0 x minimum ice thickness
- 10 percent + — multiply 2.4 x minimum ice thickness

Under thawing temperatures where the average air temperature exceeds 0 degrees Celsius, increase the required ice thickness given in the tables by 20 percent or, reduce the allowable weight by one-third.

Additional necessary precautions

Continuous use areas

Construction of flooded areas for ice crossings, parking areas or bridge erection requires daily measurements for ice thickness, air temperature and ice cracks. Currents can create wear to the underside of the ice and reduce its thickness.

Vehicle speed

Vehicle speed should be reduced as ice thickness and water depth decreases. Water pressure waves under the ice requires this.

It is recommended that vehicle speeds should be less than 30 kilometres per hour for safe passage on the appropriate thickness of effective clear ice i.e. Table 1, over depth of water less than 15 metres. Vehicle speeds should be less than 15 kilometres per hour when approaching shore or travelling parallel and close to shore.

Heavy lifts

Timer mats should be used to spread the surface area bearing on ice to support crawler tracks and outrigger pads when using mobile cranes to hoist heavy lifts.

Other precautions when travelling on lakes


- Spacing of at least 800 metres between vehicles when travelling in convoy.
- Truck doors should be removed or securely fastened in the fully open position while travelling over ice.
- When travel is in isolated areas and over great distances, there should be an accompanying vehicle.
- Continuous travel will fatigue ice and cause failure. Change roads on ice landings frequently.


Other precautions when travelling on rivers


- Ice bridges are to be located where channels are narrowest and deepest. Avoid shallow water and sand bars.
- Ice bridges installed for the full winter season should be given a 100 millimetre flood once a month.

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