

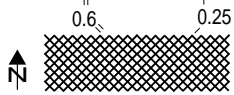
International Specification for Orienteering Maps





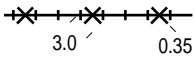
607 Out-of-bounds area

An out-of-bounds area, see also symbol 529, is drawn with vertical stripes.
Colour: purple.



608 Dangerous area

An area presenting danger to a competitor
Colour: purple.



609 Forbidden route

A route which is out-of-bounds.
Colour: purple.



610 First aid post

The location of a first aid point.
Colour: purple.



611 Refreshment point

The location of a refreshment point which is not at a control.
Colour: purple.

| | |
|---|---|
| < | gap or infill between two lines |
| — | line thickness |
| — | distance from centre to centre or length of line |
| ∅ | diameter |
| N | symbol orientated to north |

International Specification for Orienteering Maps

1 INTRODUCTION

Orienteering is now a worldwide sport. A common approach to the interpretation and drawing of orienteering maps is essential for fair competition and for the future expansion of the sport. It is the aim of the International Specification for Orienteering Maps to provide a map specification which can accommodate the widely varying situations in different countries. These specifications should be read in conjunction with the basic rules for orienteering competitions. Deviations are permissible only with the sanction of the national map committee. For international events and World Cup races such sanction must be given by the IOF after consultation with the IOF Map Committee. There is a separate specification for ski-orienteering maps.

2 GENERAL REQUIREMENTS

2.1 Orienteering and the map

Orienteering is a sport in which the runner completes a course of control points in the shortest possible time, aided only by map and compass. As in all forms of sport, it is necessary to ensure that the conditions of competition are the same for all competitors. The more accurate the map, the better this can be done, and the greater the opportunity for the course planner to set a good and fair course.

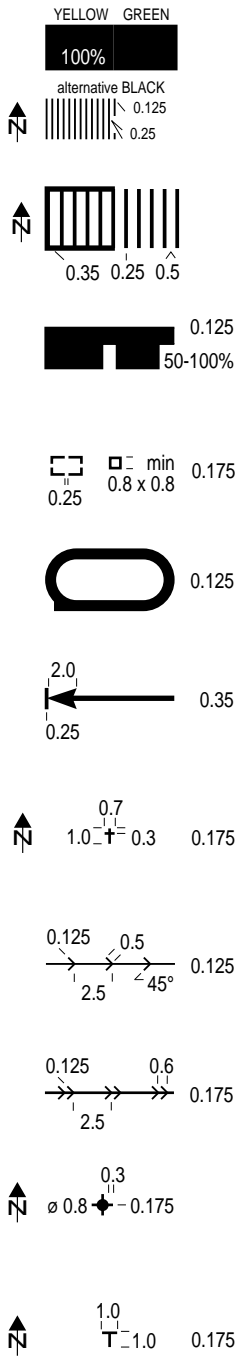
From the competitors' point of view, a detailed and legible map is a reliable guide for choice of route, and it enables him to navigate along a route chosen as suiting his navigational skill and running ability. However, skill in route choice loses all meaning if the map is not a true picture of the ground - if it is inaccurate, out-of-date or of poor legibility.

Anything which bars progress is essential information - cliffs, water, dense thicket. The path and track network shows where the going and navigation is easiest. A detailed classification of the degrees of hindrance or good going helps the competitor to make the right decisions. Orienteering is first of all to navigate by map reading. An accurate map is therefore necessary for a good and effective route choice. No competitor should gain an advantage or suffer a disadvantage because of faults on the map.

The aim of the course planner is a course where the deciding factor in the results will be navigational skill. This can be achieved only if the map is sufficiently accurate, complete and reliable, and is also clear and legible under competition conditions. The better the map the course planner has, the greater the chance he has of setting good, fair courses, whether for the elite or for the novice.

Great detail on the map offers the planner many features for controls, and hence enables him to choose good legs, vary control sites and check that the controls are correctly placed on the map.

Controls are the most important building blocks of a course. Choice of sites, placing of the markers, checking their positions, and locating controls in competition, all put definite demands on the map. The map must give a complete, accurate and detailed picture of the terrain. For an international event, it must be up-to-date in all parts which could affect the end result of the competition. If it is not up-to-date it must be improved.



528 Settlement

Houses and gardens and other built up areas. Roads, buildings and other significant features within a settlement must be shown. If all buildings cannot be shown an alternative symbol (black line screen 33%, 25 l/cm) may be used. Colour: green 50% and yellow 100%.

529 Permanently out of bounds

Areas which are permanently forbidden to the runner are shown as out of bounds. The screen is superimposed on the normal map detail. A bounding line may be drawn if there is no natural boundary. Colour: black or purple.

530 Parking area

A paved, asphalt or other surfaced area for parking or other purposes. Colour: black and brown 50 - 100% (40 lines/cm).

531 Ruin

The ground plan of a ruin is shown to scale, down to the minimum size shown opposite. Very small ruins may be drawn with a solid line. Colour: black.

532 Sports track

The plan of a sports track is shown to scale with yellow superimposed. Colour: black with yellow and/or brown.

533 Firing range

A firing range is shown with a special symbol to indicate the need for caution. Associated buildings are individually marked. Colour: black.

534 Grave

A distinct grave marked by a stone or shrine. Location is at the centre of gravity of the symbol, which is orientated to north. A cemetery is shown by using grave symbols as space permits. Colour: black.

535 Crossable pipeline

A pipeline (gas, water, oil, etc.) above ground level which can be crossed over or under. Colour: black.

536 Uncrossable pipeline

A pipeline which cannot be crossed. Colour: black.

537 High tower

A high tower standing above the level of the surrounding forest. Location is at the centre of gravity of the symbol. Colour: black.

538 Small tower

An obvious shooting platform or seat, or small tower (or a trig. point in some countries). Location is at the centre of gravity of the symbol. Colour: black.

Absolute height accuracy is of little significance on an orienteering map. On the other hand, it is important that the map shows as correctly as possible the relative height difference between neighbouring features.

Accurate representation of shape is of great importance for the runner, because a correct, detailed and sometimes exaggerated picture of the land form is an essential precondition for map reading. However, the inclusion of a lot of small detail must not disguise the overall shapes. Drawing accuracy is of primary importance to any map user because it is closely connected with the reliability of the final map.

As a general rule, these specifications should be followed closely. However, when drawing a surveyed feature, consideration must be given to its immediate surroundings, and in order to improve legibility deviations from the specified line widths can be tolerated - see section 3.2.

2.4 Generalisation and legibility

Good orienteering terrain contains a large number and a great variety of features. Those which are most essential for the runner in competition must be selected and presented on the orienteering map. To achieve this, in such a way that the map is legible and easy to interpret, cartographic generalisation must be employed. There are two phases of generalisation - selective generalisation and graphic generalisation.

Selective generalisation is the decision as to which details and features should be presented on the map. Two important considerations contribute to this decision - the importance of the feature from the runners' point of view and its influence on the legibility of the map. These two considerations will sometimes be incompatible, but the demand for legibility must never be relaxed in order to present an excess of small details and features on the map. Therefore it will be necessary at the survey stage to adopt minimum sizes for many types of detail. These minimum sizes may vary somewhat from one map to another according to the amount of detail in question. However, consistency is one of the most important qualities of the orienteering map, and therefore the same selective criteria must be used throughout the map.

Graphic generalisation can greatly affect the clarity of the map. Simplification, displacement and exaggeration are used to this end.

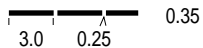
Legibility requires that the size of symbols, line thicknesses and spacing between lines be based on the perception of normal sight in daylight. In devising symbols, all factors except the distance between neighbouring symbols are considered.

The size of the smallest feature which will appear on the map depends partly on the graphic qualities of the symbol (shape, format and colour) and partly on the position of neighbouring symbols. With immediately neighbouring features, which take up more space on the map than on the ground, it is essential that the correct relationships between these and other nearby features are also maintained.

3 MAP SPECIFICATION

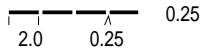
3.1 Scale and vertical interval

The scale for an orienteering map is 1:15,000 with a 5m contour interval. In flat terrain a contour interval of 2.5m may be used.



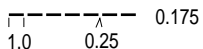
505 Vehicle track

A track or poorly maintained road suitable for vehicles only when travelling slowly. Width less than ca 3 m.
Colour: black.



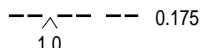
506 Footpath

A large path, or old vehicle track, which is distinct on the ground.
Colour: black.



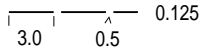
507 Small path

A small path or (temporary) forest extraction track which can be followed at competition speed.
Colour: black.



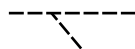
508 Less distinct small path

A less distinct small path or forestry extraction track.
Colour: black.



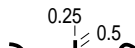
509 Narrow ride

A distinct ride, less than ca. 5 m wide. A ride is a linear break in the forest (usually plantation) which does not have a distinct path along it. Where there is a path along a ride, symbols 507 or 508 should be used in place of symbol 509.
Colour: black.



510 Visible path junction

When a path junction or intersection of paths or tracks is visible, the dashes of the symbols are joined at the junction.
Colour: black.



511 Footbridge

A footbridge with no path leading to it.
Colour: black.



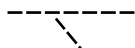
512 Crossing point with bridge

A path or track crossing a river, stream or ditch by a bridge.
Colour: black.



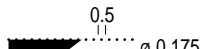
513 Crossing point without bridge

A path or track crossing a river, stream or ditch without a bridge; a ford.
Colour: black.



514 Indistinct junction

When a junction of paths or tracks is not clear, the dashes of the symbols are not joined.
Colour: black.



515 Wide ride

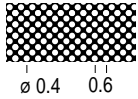
A ride or firebreak, wider than 5 m. The edges are shown with the symbol for a vegetation boundary (416). The appropriate yellow or green screen should be used to fill in between the dotted lines for open or overgrown rides respectively.
Colour: black and yellow or green.

| SYMBOL | | | 1:15,000 | | 1:7,500 | | Dimensions | |
|--------|-------------------------------|--------|----------|-------|---------|-----|---------------|-------------------|
| no. | Colour | % | Lines | LT | NT | | | |
| 116 | Broken ground | brown | - | - | 88 | 250 | ø0.35-0.5, r | |
| 210 | Stony ground | black | - | - | na | 251 | ø0.25-0.35, r | |
| 211 | Sandy ground | black | 10 | 24/cm | s | 8 | 27-10 | ø0.35, s0.9, a45° |
| | | yellow | 50 | 40/cm | s | 33 | 50-50 | |
| 212 | Bare rock | black | 30 | 54/cm | s | 52 | 65-30 | |
| 301 | Lake infill | blue | 50-100 | 40/cm | s | 33 | 50-50 | |
| 309 | Uncrossable marsh | blue | 50 | 20/cm | | 213 | 1010-50 | t0.5, s1.0 |
| 310 | Marsh | blue | 33 | 27/cm | | 69 | 326 | t0.25, s0.75 |
| 311 | Indistinct marsh | blue | - | | | 121 | 272 | t0.25, s0.85 |
| | | | | | | | | d1.8, g0.5 |
| 401 | Open land | yellow | 100 | | | | | |
| 402 | Open with scattered trees | yellow | 50 | 16/cm | | na | 1160 | ø0.8, s1.2, a45° |
| 403 | Rough open | yellow | 50 | 40/cm | s | 33 | 50-50 | |
| 404 | Rough open/scattered trees | yellow | 50 | 40/cm | s | 33 | 50-50 | |
| | | +white | 50 | 16/cm | | na | na | ø0.8, s1.2, a45° |
| 406 | Forest: slow run | green | 20 | 40/cm | s | 30 | 50-20 | |
| 407 | Undergrowth: slow run | green | 17 | 13/cm | | 67 | 334 | t0.25, s1.5 |
| 408 | Forest: difficult to run | green | 50 | 40/cm | s | 33 | 50-50 | |
| 409 | Undergrowth: difficult to run | green | 33 | 27/cm | | 69 | 954 | t0.25, s0.75 |
| 410 | Vegetation: impassable | green | 100 | | | | | |
| 412 | Orchard | green | 25 | 12/cm | | 911 | 315 | ø0.9, s1.6 |
| | | yellow | 100 | | | | | |
| 413 | Vineyard | yellow | 100 | | | | | |
| | | green | - | | | | 353 | t0.4, s1.7 |
| | | | | | | | | d2.6, g1.2 |
| 415 | Cultivated land | yellow | 100 | | | | | |
| | | +black | 5 | | | 915 | 205 | ø0.5, s1.8 |
| 501 | Road infill | brown | 50 | 40/cm | s | 33 | 50-50 | t2.25, fill1.55 |
| 502 | " | " | " | " | s | " | " | t1.7, f1.0 |
| 503 | " | " | " | " | s | " | " | t1.3, f0.6 |
| 528 | Settlement | yellow | 100 | | | | | |
| | | +green | 50 | 40/cm | s | 33 | 50-50 | |
| | alternative | black | 33 | 27/cm | s | 69 | 326 | t0.25, s0.75 |
| 529 | Out of bounds | black | 33 | 13/cm | s | 924 | 226 | t0.5, s1.5 |
| 530 | Parking area | brown | 50 | 40/cm | s | 33 | 50-50 | |

s standard commercial photographic screen
special o-screen - available from IOF Map Committee through Harveys

LT indicates a Letratone screen
NT indicates a Normatone screen

t = line thickness
ø = diameter
s = space
between centres
d = dash length
g = gap
r = random dots



404 Rough open land with scattered trees

Where there are scattered trees in rough open land, areas of white (or green) should appear in the tone. Such an area may be generalised by using a regular pattern of large white dots in the yellow screen.
Colour: yellow 50% (40 lines/cm), white 50% (16.75 lines/cm).



405 Forest: easy running

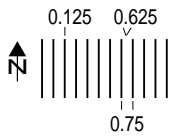
Open forest where there is no hindrance to the runner
Colour: white.



20%

406 Forest: slow running

An area with dense trees (low visibility) which reduces running to ca. 50 - 80% of normal speed.
Colour: green 20% (40 lines/cm).



17%

407 Undergrowth: slow running

An area of dense undergrowth but otherwise good visibility (brambles, heather, low bushes, and including cut branches) which reduces running to ca. 50 - 80% of normal speed. This symbol may not be combined with 406 or 408.
Colour: green 17% (13 lines/cm).



50%

408 Forest: difficult to run

An area with dense trees or thicket (low visibility) which reduce running to ca. 10 - 50% of normal speed.
Colour: green 50% (40 lines/cm).



33%

409 Undergrowth: difficult to run

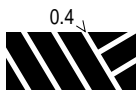
An area of dense undergrowth but otherwise good visibility (brambles, heather, low bushes, and including cut branches) which reduces running to ca. 10 - 50% of normal speed. This symbol may not be combined with 406 or 408.
Colour: green 33% (27 lines/cm).



100%
min
0.25

410 Vegetation: very difficult to run, impassable

An area of dense vegetation (trees or undergrowth) which is barely passable. Running reduced to ca. 0 - 10% of normal speed.
Colour: green 100%.



0.4

411 Forest runnable in one direction

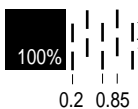
When an area of forest provides good running in one direction but less good in others, white stripes are left in the screen symbol to show the direction of good running.
Colour: green.



0.45 0.8

412 Orchard

Land planted with fruit trees, bushes.
Colour: yellow 100% and green 25% (12 lines/cm).



100% 1.3

0.2 0.85

413 Vineyard

The lines may be orientated to show the direction of planting.
Colour: yellow 100% and green.

4 EXPLANATION OF SYMBOLS

Definitions of map features and specifications for the drawing of symbols are given in the following sections. Symbols are classified into 6 categories -

| | |
|-------------------|------------------|
| Land forms | (brown) |
| Rock and boulders | (black) |
| Water and marsh | (blue) |
| Vegetation | (green + yellow) |
| Man-made features | (black) |
| Course symbols | (purple) |

NOTE: dimensions are specified in mm at the scale of 1:15,000.
All drawings are at 1:7,500 for clarity only

| | |
|---|--|
| < | gap or infill between two lines |
| — | line thickness |
| — | distance from centre to centre or length of line |
| ∅ | diameter |
| N | symbol orientated to north |

4.1 Land forms

The shape of land is shown by means of very detailed contours, aided by the special symbols for small knolls, depressions, etc. This is complemented in black by the symbols for rock and cliffs. Orienteering terrain is normally best represented with a 5m contour interval. An interval of 2.5m may be necessary in certain types of terrain. It is not permissible to use different intervals on the same map.

Excessive use of form lines should be avoided as this will complicate the map and give a wrong impression of height differences. If the representation of an area needs a large number of form lines, a smaller contour interval provides a more legible alternative.

The relative height difference between neighbouring features must be represented on the map as accurately as possible. Absolute height accuracy is of less importance. It is permissible to alter the height of a contour slightly if this will improve the representation of a feature. This deviation should not normally exceed 25% of the contour interval and attention must be paid to neighbouring features.



101 Contour

A line joining points of equal height. The standard vertical interval between contours is 5 metres.
Colour: brown.

102 Index contour

Every fifth contour should be drawn with a thicker line. This is an aid to the quick assessment of height difference and the overall shape of the ground. Where one of these contours coincides with an area of small knolls or depressions, it may be shown with a normal contour line.
Colour: brown.

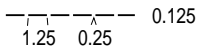
103 Form line

An intermediate contour line. Form lines are used where more information can be given about the shape of the ground. They are used only where representation is not possible with ordinary contours. Only one form line may be used between neighbouring contours.
Colour: brown.



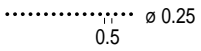
104 Slope line

Slope lines may be drawn on the lower side of a contour line, eg along the line of a re-entrant or in a depression. They are used only where it is necessary to clarify the fall of the ground.
Colour: brown.



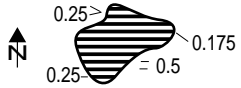
307 Minor water channel

A natural or man-made minor water channel which may contain water only intermittently.
Colour: blue.



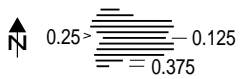
308 Narrow marsh

A marsh or trickle of water which is too narrow to be shown with symbol 310 (less than ca. 5m wide).
Colour: blue.



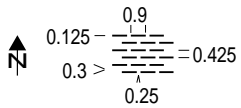
309 Uncrossable marsh

A marsh which is uncrossable or dangerous for the runner. A black line surrounds the symbol.
Colour: blue, black.



310 Marsh

A crossable marsh with a distinct edge. Symbol 310 may be combined with symbol 403 for clearly open marshes. For densely wooded marshes symbol 310 may be combined with symbols 406-410. The smallest marsh should be shown by at least two lines on the map.
Colour: blue (with yellow/green).



311 Indistinct marsh

An indistinct or seasonal marsh or area of gradual transition from marsh to firm ground, which is crossable. The edge is generally indistinct and the vegetation similar to that of the surrounding ground. Symbol 311 may be combined with symbol 403 for clearly open but indistinct marshes. There may be occasions where it is appropriate to use symbol 311 with symbol 401. For densely wooded marshes symbol 311 may be combined with the symbols 406-410.
Colour: blue (with yellow/green).



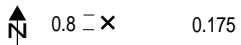
312 Well

Wells and captive springs, which are clearly visible on the ground.
Colour: blue.



313 Spring

The source of a stream with a distinct outflow. The symbol is orientated to open downstream.
Colour: blue.



314 Special water feature

A special small water feature. The definition of the symbol must always be given in the map legend.
Colour: blue.

NOTE: dimensions are specified in mm at the scale of 1:15,000.

All drawings are at 1:7,500 for clarity only

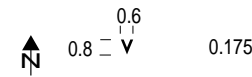
- < gap or infill between two lines
- line thickness
- distance from centre to centre or length of line
- ∅ diameter

symbol orientated to north



114 Small depression

Small shallow natural depressions and hollows (minimum diameter 2m) which cannot be shown to scale by contours are represented by a semicircle. Minimum depth from the surrounding ground should be 1m. Location is the centre of gravity of the symbol, which is orientated to north. Symbol 115 is used for man-made pits.
Colour: brown.



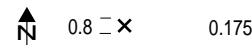
115 Pit

Pits and holes with distinct steep sides which cannot be shown to scale by symbol 106 (minimum diameter 2m). Pits with any other shape than round should be shown by contours. Minimum depth from the surrounding ground should be 1m. Location is the centre of gravity of the symbol which is orientated to north.
Colour: brown.



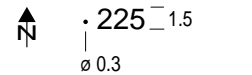
116 Broken ground

An area of pits or knolls which is too intricate to be shown in detail. The density of dots may vary according to the detail on the ground.
Colour: brown.



117 Special landform feature

This symbol can be used for a special small landform feature. The definition of the symbol must be given in the map legend.
Colour: brown.



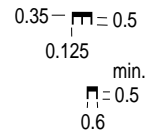
118 Spot height

Spot heights are used for the rough assessment of height differences. The height is given to the nearest metre. The figures are orientated to the north. Water levels are given without the dot.
Colour: black.

4.2 Rock and boulders

NOTE: dimensions are specified in mm at the scale of 1:15,000.

All drawings are at 1:7,500 for clarity only



Rock is a special category of land form. The inclusion of rock gives useful information about danger and runnability, as well as providing features for map reading and control points. Rock is shown in black to distinguish it from land forms features. The outline of the symbol should accurately represent the shape of the rock face projected on a horizontal plane. Care must be taken to make sure that rock features such as cliffs agree with the shape and fall of the ground shown by contours or form lines.

201 Impassable cliff

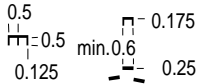
An impassable cliff, quarry or earth bank (see 106) is shown with a 0.35mm line and downward tags showing its full extent from the top line to the foot. The tags may be omitted if space is short, eg. narrow passages between cliffs (the passage should be drawn with a width of at least 0.3 mm). The tags may extend over an area symbol representing detail immediately below the rock face. When a rock face drops straight into water making it impossible to pass under the cliff along the water's edge, the bank line is omitted or the tags should clearly extend over the bank line.
Colour: black.



202 Rock pillars/cliffs

In the case of unusual features such as rock pillars or massive cliffs or gigantic boulders, the rocks may be shown in plan shape without tags. Actual size may vary according to the height of the rock.

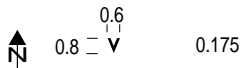
Colour: black.



203 Passable rock face

A small vertical rock face (minimum height 1m) is shown without tags. If the direction of fall of the rock face is not apparent from the contours, short tags should be drawn in the direction of the fall.

Colour: black.



204 Rocky pit

Rocky pits, holes or mineshafts which may constitute a danger to the runner. Location is the centre of gravity of the symbol, which is orientated to north.

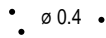
Colour: black.



205 Cave

A cave is represented by the same symbol as a rocky pit. In this case the symbol should be orientated to the slope as indicated opposite. The centre of gravity of the symbol marks the opening.

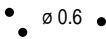
Colour: black.



206 Boulder

A small distinct boulder (minimum height 1m). Every boulder marked on the map should be immediately identifiable on the ground.

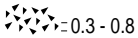
Colour: black.



207 Large boulder

A particularly large and distinct boulder.

Colour: black.



208 Boulder field

An area which is covered with so many blocks of stone that they cannot be marked individually is shown with solid non-equilateral triangles. A minimum of two triangles should be used (one only if used with other rock features). The going is indicated by the density of the triangles.

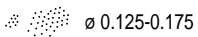
Colour: black.



209 Boulder cluster

A small distinct group of boulders so closely clustered together that they cannot be marked individually. The symbol is an equilateral triangle orientated to the north.

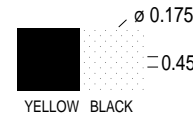
Colour: black.



210 Stony ground

Stony or rocky ground which affects going should be shown on the map. The dots should be randomly distributed with density according to the amount of rock. For large areas a screen may be used (see table p.7)

Colour: black.



211 Open sandy ground

An area of soft sandy ground or gravel with no vegetation and where running is slow. Where an area of sandy ground is open but running is good, it is shown as open land (401/402).

Colour: black 10% (24 lines/cm) and yellow 50% (40 lines/cm).



212 Bare rock

A flat area of rock without earth or vegetation is shown as bare rock. An area of rock covered with grass, moss or other low vegetation is shown as open land (401/402).

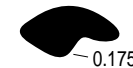
Colour: black 30% (54 lines/cm) or grey.

4.3 Water and marsh

NOTE: dimensions are specified in mm at the scale of 1:15,000.

All drawings are at 1:7,500 for clarity only

This group includes both open water and special types of vegetation caused by the presence of water (marsh). The classification is important because it indicates the degree of hindrance to the runner and provide features for map reading and control points. A black line round a water feature indicates that it cannot be crossed under normal weather conditions. In dry countries the features listed in this section may only contain water in some seasons.



301 Lake

Large areas of water are shown with full colour or a dot screen of at least 50%. Small areas of water should be shown with full colour. A black bank line indicates that the feature cannot be crossed.

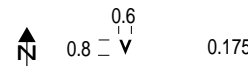
Colour: blue, black.



302 Pond

Where the lake or pond is smaller than 1mm² on the printed map, the bank line is omitted.

Colour: blue.



303 Waterhole

A water-filled pit or an area of water which is too small to be shown to scale. Location is the centre of gravity of the symbol, which is orientated to north.

Colour: blue.



304 Uncrossable river

An uncrossable river or canal is drawn with black bank lines. The bank lines are broken at a ford.

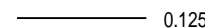
Colour: blue, black.



305 Crossable watercourse

A crossable watercourse, minimum 2m wide. The width of watercourses over 5m wide should be shown to scale.

Colour: blue.



306 Crossable small watercourse

A crossable watercourse (including a major drainage ditch) less than 2 m wide.

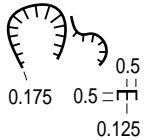
Colour: blue.



105 Contour value

Contour values are often included to aid assessment of large height differences. They are inserted in the index contours in positions where other detail is not obscured. The figures should be orientated so that the top of the figure is on the higher side of the contour.

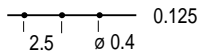
Colour: brown.



106 Earth bank

A steep earth bank is an abrupt change in ground level which can be clearly distinguished from its surroundings, e.g. gravel or sand pits, road and railway cuttings or embankments. The tags should show the full extent of the slope, but may be omitted if two banks are close together. Impassable banks should be drawn with symbol 201 (impassable cliff).

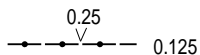
Colour: brown.



107 Earth wall

Distinct earth wall.

Colour: brown.



108 Small earth wall

A partly ruined earth wall may be shown with a dashed line.

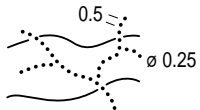
Colour: brown.



109 Erosion gully

An erosion gully or trench which is too small to be shown by symbol 106 is shown by a single line. The line width reflects the size of the gully. Minimum depth 1m. The end of the line is pointed.

Colour: brown.



110 Small erosion gully

A small erosion gully or trench. Minimum depth 0.5m.

Colour: brown.



111 Knoll

Knolls are shown with contour lines. A prominent knoll falling between contour lines may still be represented by a contour line if the deviation from the actual contour level is less than 25%. Smaller or flatter knolls should be shown with form lines.

Colour: brown.



112 Small knoll

A small obvious mound or rocky knoll which cannot be drawn to scale with a contour (diameter of mound less than ca. 5 m). Knolls of any other shape than round should be shown by contours. The height of the knoll should be a minimum of 1m from the surrounding ground.

Colour: brown.



113 Depression

Depressions are shown with contours or form lines and slope lines. Prominent depressions falling between contour lines may be represented by a contour line if the deviation from the actual contour level is less than 25%. Smaller or shallower depressions should be shown by form lines.

Colour: brown.

4.4 Vegetation

The representation of vegetation is important to the orienteer because it affects runnability and it also provides features for map reading.

COLOUR

The basic principle is as follows:

- **white** represents runnable forest.
- **yellow** represents open areas divided into several categories.
- **green** represents the density of the forest according to its runnability and is divided into several categories.

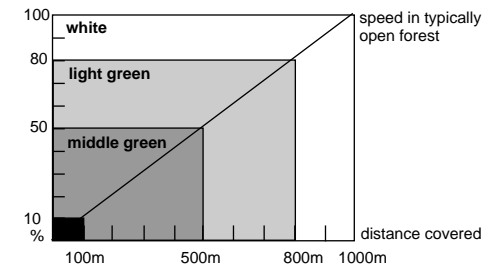
RUNNABILITY

White represents typically open runnable forest for the particular type of terrain. If no part of the forest is runnable then no white should appear on the map.

The runnability depends on the nature of the forest (density of trees/brushwood and undergrowth - bracken, brambles, nettles, etc.) but does not take account of marshes, stony ground etc. which are shown by separate symbols.

Runnability in forest is divided into 4 categories according to running speed. If speed through typically open runnable forest is, for example, 5 min/km, the following ratios apply:

| | | |
|------------------|---------|----------------|
| open forest | 80-100% | 5 - 6m15s/km |
| slow run | 50-80% | 6m15s - 10m/km |
| difficult to run | 10-50% | 10 - 50 min/km |
| fight | 0-10% | > 50 min/km |



NOTE: dimensions are specified in mm at the scale of 1:15,000.

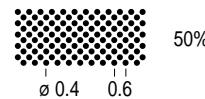
All drawings are at 1:7,500 for clarity only



401 Open land

Cultivated land, fields, meadows, grassland, etc. without trees, offering easy running.

Colour: yellow.



402 Open land with scattered trees

Meadows with scattered trees or bushes, with grass or similar ground cover offering easy running. Very small areas are shown as open land (401).

Colour: yellow 50% (16.75 lines/cm).



403 Rough open land

Heath, moorland, felled areas, newly planted areas (trees lower than ca. 1m) or other generally open land with rough ground vegetation, heather or tall grass. Symbol 403 may be combined with symbols 407 and 409 to show reduced runnability.

Colour: yellow 50% (40 lines/cm).

3.3 Printing

An orienteering map must be printed on good, possibly water resistant, paper (weight 80 - 120 gsm). It will be in up to 6 colours depending on the cartography and the nature of the terrain it covers.

Special care must be taken to ensure an exact register of colours. On a map printed in several colours the course planner must have the opportunity to check the register via superimposed crosses in the different colours. The maximum acceptable error is 0.2 mm.

Legibility depends on the correct choice of colours. The following recommendations are intended to standardize maps as much as possible. The alternative colour given can be used in preference to the recommended colours, since the ultimate choice of colour also depends on the structure of the terrain. The recommendations are given in the PMS system (Pantone Matching System).

| Colour | PMS number | Alternative |
|--------|---------------|-------------|
| Black | Process black | |
| Brown | 471 | |
| Yellow | 136 | 122, 129 |
| Blue | 299 | |
| Green | 361 | |
| Grey | 428 | 427 |
| Violet | Purple | |

3.4 Larger scale maps

Maps at 1:10,000 may be produced for two reasons, (a) for greater legibility, or (b) for special types of terrain.

3.4.1 Maps where greater legibility is required

These may be maps of small areas to be used for training, for introductory and school events. They may be competition maps for older and younger age groups where reading fine lines and small symbols becomes a problem.

These maps must be drawn with lines, line screens and symbol dimensions 50% greater than those used for 1:15,000 maps. Where practical the same dot screens as used at 1:15,000 will give the most legible map and are therefore to be preferred. In practice drawing the artwork at 1:7,500 for reduction to 1:15,000 will give the correct dimensions if the same artwork is reduced to 1:10,000. It may be more practical and cheaper to produce a 1:10,000 version by enlarging the 1:15,000 film negatives/positives.

For 1:10,000 maps the spacing of grid lines should be 25mm which represents 250m on the ground.

In education there is usually a progression of scales from 1:2,500 to 1:5,000 to 1:10,000. Maps at very large scales such as 1:2,500 will clearly contain more detail such as playground equipment. Line dimensions for 1:10,000 maps should also be used for these maps.

3.4.2 Special terrain

In exceptional cases, where terrain is extremely complex and it is not possible to draw the essential detail at 1:15,000, a 1:10,000 map drawn with 1:15,000 dimensions is permissible. For international events the use of larger scales must be approved by the IOF.

414 Distinct cultivation boundary
The boundary of cultivated land when not shown with other symbols (fence, wall, path, etc.) is shown with a black line. A permanent boundary between different types of cultivated land is also shown with this symbol.
Colour: black.

415 Cultivated land
Cultivated land which is seasonally out-of-bounds due to growing crops may be shown with a black dot screen.
Colour: yellow 100%, black 5%.

416 Distinct vegetation boundary
A distinct forest edge or very distinct vegetation boundary within the forest.
Colour: black.

417 Indistinct vegetation boundary
Indistinct boundaries between areas of green, yellow or white are shown without a line. The edge of the area is shown only by the change in colour or dot screen.

418, 419 Special vegetation features
Symbols 418 and 419 can be used for special small vegetation features. The definition of the symbol must be given in the map legend.
Colour: green.

4.5 Man-made features

NOTE: dimensions are specified in mm at the scale of 1:15,000.
All drawings are at 1:7,500 for clarity only

The track network provides important information for the runner and the classification must be clearly recognisable on the map. Particularly important for the competitor is the classification of smaller paths. Account must be taken not only of the width, but also of how obvious the path is to the runner. Other man-made features are also important both for map reading and as control points.

501 Motorway
A road with two highways for the use of motor traffic only. The space between the black lines must be filled with brown (50-100%)
Colour: black and brown 50-100% (40 lines/cm).

502 Major road
Road wider than 5 m. The space between the black lines must be filled with brown (50-100%). A road under construction (symbols 501, 502 and 503) may be shown with broken lines.
Colour: black and brown 50-100% (40 lines/cm).

503 Minor road
Road 3 - 5 m wide. The space between the black lines must be filled with brown (50-100%).
Colour: black and brown 50-100% (40 lines/cm).

504 Road
A maintained road suitable for motor vehicles in all weather less than 3m wide.
Colour: black.

3.2 Dimensions of map symbols

It is recommended that an orienteering map is surveyed and drawn at 1:7,500 - twice the printing scale. Other reduction ratios may be used. When scribing, a 1:1 ratio is normal.

Dimensions in this book are given at the printed scale of 1:15,000.

The line widths are based on the micronorm pen sizes. All line widths and symbol dimensions must be held within 20% of their specified value. Deviations from the nominal value must only be used to improve legibility. Certain minimum dimensions must also be observed. These are based on both printing technology and the need for legibility:

MINIMUM DIMENSIONS

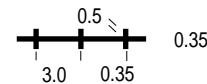
- The gap between two fine lines of the same colour, in brown or black: 0.15 mm.
- The smallest gap between two blue lines: 0.25 mm.
- Shortest rock face symbol: 0.6 mm
- Shortest stream or ditch symbol: 0.6 mm.
- Smallest bend in contour (spur or reentrant): 0.25 mm (from centre to centre of the lines).
- Smallest area of marsh: at least two lines with a length of 0.5 mm.
- Shortest dotted line: at least two dots.
- Shortest dashed line: at least two dashes.
- Smallest area enclosed by a dotted line: 1.5 mm (diameter) with 5 dots.
- Smallest area of colour
 - Blue, green, grey or yellow full colour: 0.5mm²
 - Black dot screen: 0.5mm²
 - Blue, green or yellow dot screen: 1.0 mm²

All features smaller than the dimensions above must be either exaggerated or omitted, depending on whether or not they are of significance to the orienteer. When a feature is enlarged, neighbouring features must be displaced so that the correct relative positions are maintained.

SCREENS

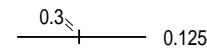
Vegetation, open areas, marshes, etc. are shown with dot or line screens. The following two tables list the permissible combinations of screens and the commercial availability of screens to meet the specifications. Some countries have produced special orienteering screens.

| | | |
|-----------------------------------|----------------------------------|--------------------------|
| 116 Broken ground | 116 Broken ground | ○ Permitted combinations |
| 210 Stony ground | 210 Stony ground | |
| 309 Uncrossable marsh | 309 Uncrossable marsh | |
| 310 Marsh | 310 Marsh | |
| 311 Indistinct marsh | ○ 311 Indistinct marsh | |
| 401 Open land | ○ 401 Open land | |
| 402 Open land, scattered trees | ○ 402 Open land, scattered trees | |
| 403 Rough open land | ○ 403 Rough open land | |
| 404 ... with scattered trees | ○ 404 ... with scattered trees | |
| 406 Forest, slow run | ○ 406 Forest, slow run | |
| 407 Undergrowth, slow run | ○ 407 Undergrowth, slow run | |
| 408 Forest, difficult to run | ○ 408 Forest, difficult to run | |
| 409 Undergrowth, difficult to run | ○ 409 Undergrowth, difficult | |
| 410 Vegetation, fight | ○ 410 vegetation, fight | |



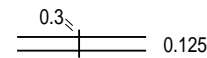
516 Railway

A railway or other kind of railed track (tramway, truckway, etc.).
Colour: black.



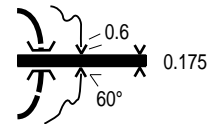
517 Power line

Power line, cableway or skilift. The bars indicate the exact location of the pylons.
Colour: black.



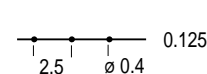
518 Major power line

Major power lines should be drawn with a double line.
Colour: black.



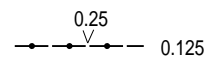
519 Tunnel

A way under roads, railways, etc. which may be used by the runner. This symbol is used whether or not the tunnel has a track leading to it.
Colour: black.



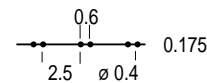
520 Stone wall

A stone wall or stone-faced bank.
Colour: black.



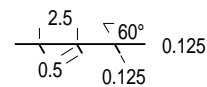
521 Ruined stone wall

A ruined stone wall may be shown by a dashed line.
Colour: black.



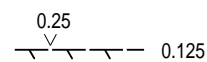
522 High stone wall

A stone wall higher than ca 1.5m, not crossable to the average orienteer.
Colour: black.



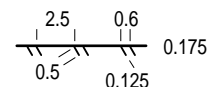
523 Fence

A wooden or wire fence less than ca. 1.5 m high.
Colour: black.



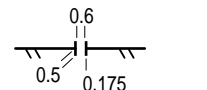
524 Ruined fence

A ruined fence may be shown with a dashed line.
Colour: black.



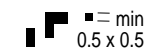
525 High fence

A boarded or wire fence higher than ca 1.5 m, not crossable to the average orienteer, eg. deer fence.
Colour: black.



526 Crossing point

All ways through or over high fences or walls must be indicated. The symbol may also be used for a gate through or stile over a stone wall (520) or a fence (523).
Colour: black.



527 Building

A building is shown with its ground plan so far as the scale permits.
Colour: black.

For the mapper, the task is knowing which features to map and how to represent them. A continuing involvement in the sport is important for a basic understanding of the requirements for the orienteering map - its content, the need for accuracy, the level of detail and above all need for legibility.

2.2 Content

An orienteering map is a detailed topographic map. The map must contain the features which are obvious on the ground to a competitor at running speed. It must show every feature which could influence map reading or route choice - land forms, rock features, ground surface, runnability, main land uses, hydrography, settlement and individual buildings, the path and track network, other lines of communication and features useful from the point of view of navigation.

The shape of the ground is one of the most important aspects of an orienteering map. The correct use of contours to show a three dimensional picture of the ground - shape and height difference - cannot be overemphasised.

The degree to which a feature is recognisable, the openness of the forest and runnability of the terrain should be taken into consideration at the survey stage.

Boundaries between different types of ground surface provide valuable reference points for the map reader. It is important that the map shows the edges of areas of marsh, solid ground, boulder field, and the fault lines of rocky terrain.

Runnability and the openness of the terrain affect route choice and the running speed. Information on these factors must therefore be shown on the map by classifying paths and tracks, by indicating whether marshes, water features, rock faces and thick forest are passable, and by showing the feasibility on the ground surface and the presence of open areas. Clearly visible vegetation boundaries should also appear since they are useful for map reading.

The map must contain the features which are obvious on the ground and which are of value from the point of view of map reading. An attempt must be made when surveying to maintain the clarity and legibility of the map, i.e. the minimum dimensions designed for normal sight must not be forgotten when choosing the degree of generalisation.

The map should contain some place names to help the competitor to orientate his map to north. Names should be written from west to east and placed to avoid obscuring important features. The style of lettering should be simple.

North lines are black 0.125-0.175 mm lines pointing to magnetic north. Their spacing on the map should be 33.33 mm which represents 500 m on the ground at the scale of 1:15 000. North lines may be broken if they obscure small features such as boulders, knolls, cliffs, stream junctions, path ends, etc. In exceptional cases blue 0.175 lines may be used. The sides of the map (paper) should be parallel to the magnetic north lines. Arrowheads may be used to show magnetic north.



2.3 Accuracy

The general rule should be that competitors shall not perceive any inaccuracy in the map. The accuracy of the map as a whole depends upon the accuracy of measurement (position, height and shape) and the accuracy of drawing. Accuracy of position on an orienteering map must be consistent with that obtained by compass and pacing. A feature must be positioned with sufficient accuracy to ensure that a competitor using compass and pacing will perceive no discrepancy between map and ground. In general a 5% accuracy in distance between neighbouring features will satisfy these requirements.



539 Cairn
Cairn, memorial stone or boundary stone (or a trig. point in some countries) more than 0.5 m high.
Colour: black.

1.0  0.175

540 Fodder rack
A fodder rack which is free standing or built on to a tree. Location is at the centre of gravity of the symbol. For land access reasons these may be omitted.
Colour: black.

 1.0  0.175
60°


541,542 Special man-made features
Special man-made features are shown with these symbols. The definition of the symbols must be given in each case in the map legend.
Colour: black.

 0.8  0.8 0.175

4.6 Overprinting symbols

Note: all specified dimensions are in mm at the printed scale of 1:15,000. Drawings in this section are at 1:15,000 also.

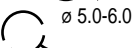
Courses should be overprinted at least for elite classes. For other classes they can be drawn by hand.

 7.0 0.35

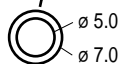
601 Start
The start or map issue point (if not at the start) is shown by an equilateral triangle which points in the direction of the first control. The centre of a triangle or circle shows the precise position of the feature but it is not actually marked.
Colour: purple.

1  0.35

602 Control point
The control points are shown with circles. The size of the circles should be chosen to minimise interference with map detail around the controls. The controls are numbered in order, with the figures orientated to the north. The start, controls and finish are joined with lines in numerical order. Sections of the lines or circles should be omitted to leave important detail showing.
Colour: purple.

 \varnothing 5.0-6.0
18

603 Marked route
A marked route is shown on the map with a dashed line.
Colour: purple.

 \varnothing 5.0 \varnothing 7.0 0.35

604 Finish
The finish is shown by two concentric circles.
Colour: purple.

 = 0.7

605 Uncrossable boundary
A boundary which it is **not permitted** to cross.
Colour: purple.

0.6  3.0 0.35

606 Crossing point
A crossing point through or over a wall or fence, or across a street or railway or a tunnel is drawn on the map with two lines curving outwards.
Colour: purple.