

The IP code or Ingress Protection ratings are defined in international standard EN 60529 (British BS EN 60529:1992, European IEC 60529). They are used to define levels of sealing effectiveness of enclosures against intrusion from foreign matter (tools, dirt etc) and moisture. The ratings are determined by testing, additional detail of which can be found overleaf.

The IP number is composed of two numbers, the first referring to the protection against solid objects and the second against liquids. The higher the number - the better the protection. There is no direct read-across to the US MIL-STD-810, UK Def-Stan 00-35 or AECTPs (Allied Environmental and Test Publications). SST normally performs qualification testing on equipment such as Rugged Notebooks, Tablets and equipment designed for use in a Harsh Environment to ensure that equipment is suitably protected against the environment into which it is to be deployed.

## First Number

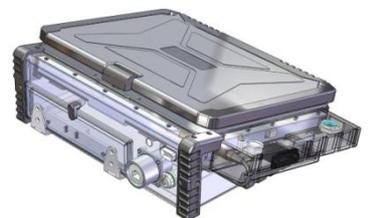
- 0** - No protection (Sometimes X)
- 1** - Protected against solid objects up to 50mm<sup>2</sup>
- 2** - Protected against solid objects up to 12mm<sup>2</sup>
- 3** - Protected against solid objects up to 2.5mm<sup>2</sup>
- 4** - Protected against solid objects up to 1mm<sup>2</sup>
- 5** - Protected against dust, limited ingress (no harmful deposit)
- 6** - Totally protected against dust

## Second Number

- 0** - No protection (Sometimes X)
- 1** - Protection against vertically falling drops of water (e.g. condensation)
- 2** - Protection against direct sprays of water up to 15° from vertical
- 3** - Protection against direct sprays of water up to 60° from vertical
- 4** - Protection against water splashed from all directions - limited ingress permitted
- 5** - Protected against low pressure jets of water from all directions- limited ingress permitted
- 6** - Protected against powerful jets of water or heavy seas - limited ingress permitted
- 7** - Protected against the effect of immersion- between 15cm and 1m for 30 minutes
- 8** - Protected against long periods of immersion under pressure - user stated requirement

## Custom Developments

With an in-depth understanding of relevant standards and testing SST demonstrates expertise in rugged design and COTS product enhancement for TEMPEST, EMC and rugged solutions. With in-house TEMPEST, EMC and Environmental testing capability as well as Prototyping and Manufacturing facilities, SST can provide fast and reliable turn-around times from design through to manufacture and qualification.



## Military Rugged

SST specialises in the design, manufacture and qualification of Military Rugged electronic hardware and systems for man-pack, vehicles, land deployed, airborne and naval installations and for use in a Harsh Environment.

## Protection against solid particle penetration or contact

Level	Protection against	Explanation
<b>0_</b>	none	Contents are not protected against penetration of solid foreign matter.
<b>1_</b>	penetration by large solid matter	Protects against penetration by solid matter with a diameter >50mm Protects accidental contact from parts inside, not against voluntary contact.
<b>2_</b>	penetration by medium sized solids	Protects against penetration by solid matter with a diameter >12mm Protects fingers from accidental contact with certain parts inside the enclosure.
<b>3_</b>	penetration by small solid matter	Protects against penetration by solid matter with a diameter >2.5mm Protects objects with a thickness >2.5mm from contact inside the machine.
<b>4_</b>	penetration by very small solids	Prevents solid matter with a diameter >1mm from entering the enclosure. Protects objects with a thickness >1mm from contact inside the machine.
<b>5_</b>	dust deposits	Dust quantity allowed to enter or deposit is reduced to ensure proper function. Completely protects from contact with certain parts inside the machine.
<b>6_</b>	penetration of dust particles	Totally prevents dust from entering machine. Completely protects from contact with charged or moving parts inside.

## Protection against liquid ingress

Level	Protection against	Explanation
<b>_0</b>	one	No particular protection.
<b>_1</b>	vertical water drops	Vertically falling water drops must have no harmful effect.
<b>_2</b>	oblique water drops	Water drops that fall at any angle up to 15° from the vertical must not damage the machine.
<b>_3</b>	dripping water	Water that falls at any angle up to 60° from the vertical must not damage the machine.
<b>_4</b>	spraying water	Water sprayed from any direction against the machine must not cause damage.
<b>_5</b>	jets of water	Jets of water from any direction against the machine must not cause damage.
<b>_6</b>	flooding	Water, which penetrates the machine because of temporary flooding, such as rough sea, must not damage the machine.
<b>_7</b>	immersion	When the machine is immersed for a predetermined time, water must not enter in such quantities as to cause damage.
<b>_8</b>	submersion	When the machine is submerged at a predetermined pressure for an undetermined period of time, water must not enter the machine in such quantities as to cause damage.

## Liquid ingress testing regime

	Test for protection against	Test
<b>_0</b>	Vertically dripping water	Test duration: 10 minutes, equivalent to 1mm rainfall per minute.
<b>_1</b>	Dripping water when EUT tilted up to 15°	Test duration: 10 minutes, equivalent to 3mm rainfall per minute.
<b>_2</b>	Spraying water at an angle up to 60°	Test duration: 5 minutes water volume: 0.7 litres per minute at pressure: 80–100 kN/m <sup>2</sup> .
<b>_3</b>	Splashing water	Test duration: 5 minutes water volume: 10 litres per minute at pressure: 80–100 kN/m <sup>2</sup> .
<b>_4</b>	water jets	Test duration: at least 3 minutes, water volume: 12.5 litres per minute via 6.3mm nozzle at distance of 3m from any direction at pressure: 30 kN/m <sup>2</sup> .
<b>_5</b>	Powerful water jets	Test duration: at least 3 minutes, water volume: 100 litres per minute via 12.5mm nozzle at distance of 3m from any direction at pressure: 100 kN/m <sup>2</sup> .
<b>_6</b>	Immersion up to 1 m	Test duration: 30 minutes, immersion at depth of 1m.
<b>_7</b>	Immersion beyond 1 m	Test duration: continuous immersion in water, depth specified by manufacturer.