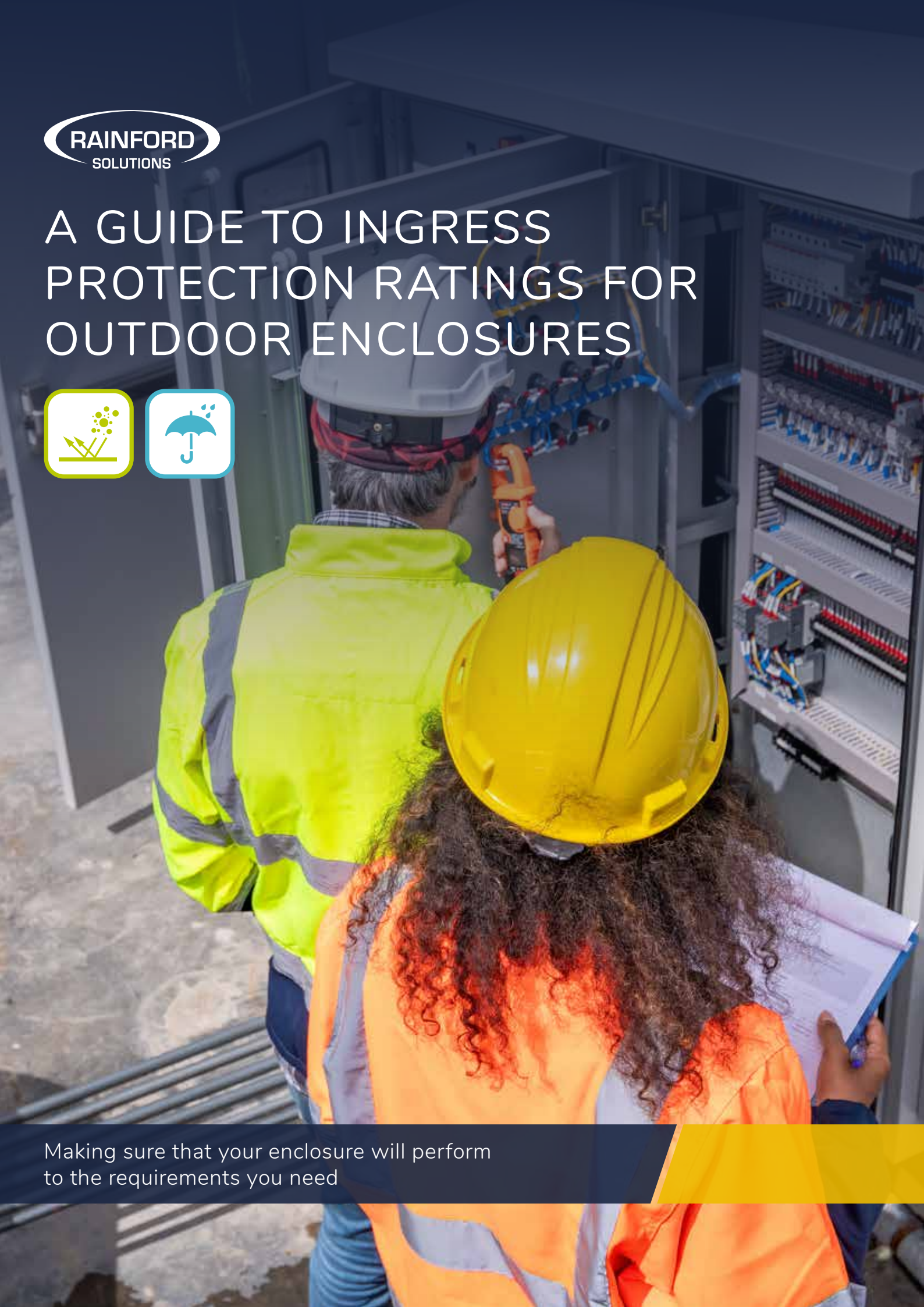
RAINFORD SOLUTIONS

A GUIDE TO INGRESS PROTECTION RATINGS FOR OUTDOOR ENCLOSURES



Making sure that your enclosure will perform to the requirements you need

IP ? ?

What are IP ratings?
An IP rating (also known as Ingress Protection Rating) indicates how well a device is protected against solids and liquids. Sometimes called the International Protection rating, it is defined by the International Electrotechnical Commission (IEC) under the international standard EN 60529 (British BS EN 60529: 1992 – Degrees of protection provided by enclosures - IP Code).

It defines degrees of protection from undesirable ingress provided by enclosures for low voltage electrical equipment with a rated voltage not exceeding 72.5 kV. It also specifies scientifically the method of testing that a UKAS accredited testing laboratory would perform to provide certification.

Why are IP ratings necessary?
Electrical and electronic systems can be negatively affected by intrusion by solids such as insects, vermin, dust, curious fingers or vandals tools and water sprays, drips or submersion. Potential impacts include costly equipment malfunction, failure and danger to life.

IP Ratings help ensure that your enclosure will perform to the requirements you need. For example, for a telecoms or rail network operator the IP rating provides more detailed information than vague terms like “waterproof”. When housing valuable components that are critical to the uptime of a service, such as amplifiers, routers and servers, the IP rating provides reassurance that the equipment will be suitably protected.

How do IP ratings work?
The IP code is composed of two numerals and gives users a clear indication of the level of sealing effectiveness and resistance offered by an electrical enclosure against unwanted intrusion from solids and water.

What do the two numerals in an IP rating mean?
An IP rating (Ingress Protection) consists of the letters IP followed by two numerals, which together represent different forms of environmental influence. The higher the number, the better the level of protection.

The first numeral
The first numeral refers to the protection against solid objects and is rated on a scale from 0 (no protection) to 6 (no ingress of dust).

The second numeral
The second numeral rates the enclosures protection against liquids and uses a scale from 0 (no protection) to 9 (high pressure hot water from different angles).

If a number is replaced by 'X' this indicates that the enclosure is not rated for that specification, i.e. solid or water.

IP ratings table

An IP ratings table has been constructed by the International Electrotechnical Commission (IEC).

IP	?	?
Solid Protection		**Liquid protection**
No protection	0	0 No protection
Protected against solid objects over 50 mm, e.g. accidental touch by hands	1	1 Protected against vertically falling drops of water, e.g. condensation
Protected against solid objects over 12 mm, e.g. fingers	2	2 Protected against direct sprays of water up to 15° from the vertical
Protected against solid objects over 2.5 mm, e.g. tools & wires	3	3 Protected against direct sprays of water up to 60° from the vertical
Protected against solid objects over 1 mm, e.g. wires & nails	4	4 Protected against water splashed from all directions, limited ingress permitted
Protected against dust, limited ingress, no harmful deposits	5	5 Protected against low pressure jets of water from all directions, limited ingress permitted
Totally protected against dust	6	6 Protected against strong jets of water, e.g. on ships deck, limited ingress permitted
Protection level not formally tested	X	7 Protected against the effects of immersion between 15 cm and 1 m
		8 Protected against long periods of immersion under pressure
		9 Protection from close range, powerful, high temperature water jets
		X Protection level not formally tested

Third digit
Sometimes on IP ratings, there is a letter at the end of the code. This is supplementary information relating to 'other protections'.

Letters A to D denote the protection of personnel against access to hazardous parts with:

A	Back of hand
B	Finger
C	Tool
D	Wire

Letters F to W denote protection of the equipment specific to:

F	Oil resistant
H	High-voltage device
M	Device moving during water test
S	Device standing still during water test
W	Weather conditions

For example, **IP55W** gives limited protection from dust, low-pressure water jets from any direction and against damp and wet weather.

What IP rating do I need for critical infrastructure enclosures?
Typically, IP ratings of between 44 and 65 may be used for both indoor and general outdoor use. Anything lower than IP44 should only be used indoors. However, the specific IP rating will depend on a number of factors including: what the enclosure will be housing; how much protection is needed; deployment location; and environmental conditions. It's worth noting here that the IP code does not test for outdoor/weather resistance during seasonal changes and for long periods of time (e.g., years outside during multiple seasons).

Selecting the right IP is not always a straightforward process. For example, it's common to think that a high IP rating such as IP67 will provide protection against everything. However, immersion is different from spray jets: immersion won't damage a piece of equipment rated IP67. However, that same piece of equipment may be destroyed by exposure to jets of spraying liquid.

Furthermore, although equipment that has been purpose-designed to be housed outside will be hardened for extended temperature ranges and be less sensitive to environmental conditions like high humidity, IP ratings as required attributes could work in opposition to each other. For example, the higher the IP rating the more the enclosure will be airtight, however this can create thermal heat management issues.

The following are the most common IP ratings for outdoor equipment enclosures.

IP54

IP54 rating
Equipment that has been designed hardened for outdoor use will perform well in an enclosure rated to IP54. It will give a good level of protection from airborne dust and splashing rain. IP54 allows some ingress of water, subjectively defined as 'limited'.

IP55

IP55 rating
This rating is more appropriate for equipment likely to be sensitive to water, or where rain is likely to be often strongly wind-blown at a variety of angles.

IP65

IP65 rating
Where the environment is dusty or dirty (for example where train brake dust is prevalent and contained, such as in tunnels). IP65 rates the enclosure as dust-tight and protected from low pressure jets of water. Achieving this rating will create an almost air-tight enclosure, so careful consideration of heat management is now also a factor to consider.

The importance of selecting the right IP rating
In today's rapidly expanding digital infrastructure, outdoor equipment enclosures are an essential system component and must provide simultaneous protection from multiple threats. It's crucial to choose an enclosure with the correct IP rating and as we've demonstrated in this guide, it's not always that simple.

Getting it wrong can have a large impact on your business, resulting in damaged equipment, higher levels of replacement, repair and maintenance.

Talk to the experts
We've been manufacturing enclosures for more than 40 years. For some customers, we build enclosures to exacting specifications that have been refined through decades of field experience. For others, our work begins with a blank sheet of paper, and we apply our own experience and expertise to help them develop a solution that meets their technical and commercial needs. Wherever you are on that continuum, a conversation with us just might reveal a few ways to maximise equipment protection without unnecessary cost or complexity.

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Quick facts:

- Established 1982
- 114,000 sq. ft. UK manufacturing facility
- High volume capacity
- Standard range or bespoke customisations
- Value added design engineering service
- ISO 9001:2015 certified
- Continuous investment and development
- Agile design, lean manufacturing
- Equipment integration capabilities
- EU product distribution

Benefits to you:

+ High quality = reliability = low total cost of ownership
+ Capacity for national scale projects
+ Security of working with a leading supplier
+ Flexible rapid design customisation
+ Complete end-to-end solutions
+ Deep industry experience and technical excellence

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RISQS VERIFIED
Achilles UVDB QUALIFIED
member of the railalliance