

Quarterly Newsletter of
Australia's leading
supplier of low-voltage
motor control and
switchgear.

IP RATINGS WHAT DO THEY MEAN?

The degree of protection provided by enclosures of electrical equipment can be determined by the tests of AS 1939. The standard considers the protection of persons against access to hazardous parts inside the enclosure, against ingress of solid foreign objects and the protection of the equipment inside

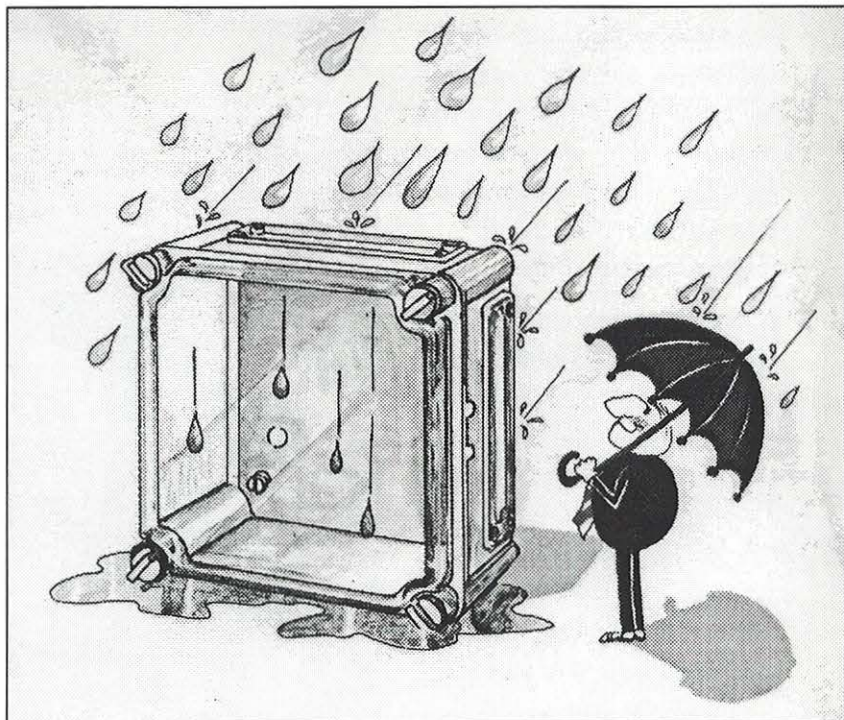
the enclosure against harmful effects due to the ingress of water.

Reference should also be made to the relevant standard for the equipment under consideration as this may specify the protection requirements in greater detail.

The IP ratings as determined by AS 1939 need to be understood as in some cases the enclosure may appear to fail in service. This "failure" can be caused by the actual service conditions being greatly different to the test requirement or even just a misunderstanding of what the pass criteria is.

IN THIS ISSUE

- IP ratings what do they mean? **1**
- The first and second characteristic numeral **2**
- How to apply the IP code **3**
- Basic arrangement of the IP code **4**



Sometimes even an umbrella can give adequate "IP" protection.

2

*IP ratings what do they mean?
(continued from page 1)*

The first characteristic numeral

This numeral indicates the protection provided against the ingress of solid foreign objects. Numerals 1 and 2 relate to the back of a hand and the standard test finger respectively. Number 1 which uses a test sphere of 50mm diameter would only be used where access is further restricted. An example would be a locked switchroom.

Numeral 3 protects against objects of $\geq 2.5\text{mm}$ diameter and numeral 4 against 1mm diameter. Numeral 5 provides dust protection but this does not mean no dust shall enter as the test method requires that dust laden air is drawn into the enclosure. This is meant to represent the movement of air that will take place due to thermal cycling effects.

If the relevant product standard for the equipment under test specifies that the enclosure is category 2 then the requirements to draw air into the enclosure does not apply. Category 2 enclosures are those that do not develop pressure differences to the surrounding air. For numeral 5 providing the dust does not accumulate in places that will

interfere with the operation of the equipment or cause tracking along the creepage distance the enclosure is acceptable.

For numeral 6 no observable deposit of dust is permitted inside the enclosure. For the first characteristic numeral the enclosure shall also comply with the lower degrees of protection than the designated one.

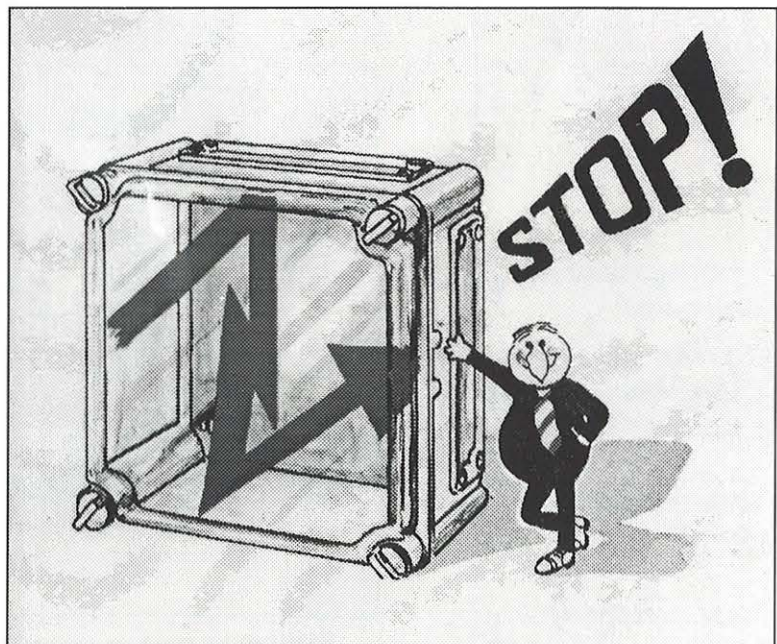
The second characteristic numeral

The second characteristic numeral indicates the degree of protection provided by the enclosure with respect to the harmful effects on the equipment due to the ingress of water.

The severity of the tests increase from numeral 1 which represents vertically falling drops of water to numeral 6 which is tested with powerful water jets. It is implied that in this range the equipment will pass all lower ratings than the one designated. For numerals 7 and 8 however which provide for immersion in water it is not to be assumed that the enclosure will pass testing for water jets. If the enclosure does comply to both it should be dual rated.

Field problems

The actual meaning of second characteristic numerals 5 and 6 can create problems in the field. These numerals indicate the ability of the enclosure to withstand water jets but many applications that use water jets



*IP ratings what do they mean?
(continued from page 2)*

for cleaning, produce an environment far harsher than that envisaged by the tests of AS 1939.

Testing for the degree of protection takes no account of variations in atmospheric conditions or all the problems created by temperature cycling.

The temperature of the water jet can be quite hot and may also include cleaning solutions. As the water jet is often being used to remove solids from the surface of the enclosure some residue may be driven into operating mechanisms fitted on the surface of the enclosure. These factors can cause jamming of the operators and rapid corrosion of some materials.

For the tests in AS 1939 many aspects have been referred by the standard to the technical committee's responsible for the relevant product standards. Unfortunately, it would seem that very few of these committees have given any real consideration to the problems created by this referral as it is difficult to find any equipment standard which provide further details.

In particular, the acceptable amount of water entry is left undefined. This means it can often be left in dispute whether the enclosure complies or not.

It is also common practice to test empty enclosures. In these cases it is difficult to evaluate what problems may be created by dust or water entry as the location and design of the fitted equipment can vary greatly. It is however the manufacturer of the **final** assembly that is responsible to ensure that after the electrical equipment is enclosed that the enclosure meets the declared degree of protection of the final product.

Atmospheric humidity

Testing for the degree of protection takes no account of variations in atmospheric conditions or all the problems created by temperature cycling. The tests are made under fixed conditions and only look at the immediate effects of any water entry.

It is possible for water to be in the bottom of an enclosure and contribute to rise in the internal humidity. If the enclosure is subject to large temperature variations condensation can easily form in critical areas and reduce the life of the installed equipment.

The provision of drain holes, ventilation and internal heating needs to be considered if condensation is likely to be a problem.

However, fitting of such accessories may lower the IP ratings considerably.

How to apply the IP code

For normal indoor use the IP code for any enclosure can be taken as an accurate guide to the performance of the product. For more demanding applications where the enclosure may be subject to say regular cleaning, varying temperatures or mounted outdoors, a more careful evaluation may be required.

In some cases the only way to determine suitability will be to trial the enclosure in the actual application.

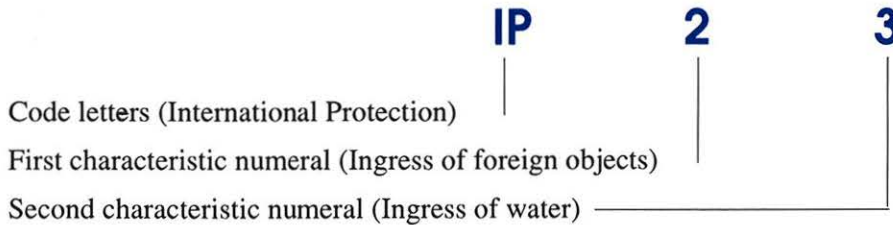
The standard (AS 1939) does not consider external influences or conditions such as corrosion, corrosive solvents, fungus, vermin, solar radiation, icing, moisture and explosive atmospheres.

It is therefore, essential that in demanding applications the IP rating is interpreted correctly and the limitations of standardised test methods fully understood. Without this understanding the product performance may not meet expectations.

4

*IP ratings what do they mean?
(continued from page 3)*

Basic arrangement of the IP code



IP rating protection against ingress of dust and liquids

IP 1st digit Degree of protection against contact and ingress of foreign bodies.	IP 2nd digit Degree of protection against ingress of liquids.
0 No protection.	0 No protection.
1 Protection against ingress of solid foreign bodies with diameters greater than 50mm.	1 Protection against vertically falling water drops.
2 Protection against contact with the fingers, protection against ingress of solid foreign bodies with diameter greater than 12mm.	2 Protection against obliquely falling water, up to an angle of 15°.
3 Protection against contact with wires etc., with diameters greater than 2.5mm, or ingress of solid foreign bodies with diameters greater than 2.5mm.	3 Protection against obliquely sprayed water, up to an angle of 60° from the vertical.
4 Protection against contact with wires etc., with diameter greater than 1mm, or ingress of solid foreign bodies with diameters greater than 1mm.	4 Protection against splash water from any direction.
5 Complete protection against contact with live parts, protection against harmful deposits of dust.	5 Protection against water-jets from any direction.
6 Complete protection against contact with live parts, protection against ingress of dust.	6 Protection against powerful water-jets from any direction.
	7 Protection against temporary immersion in water.
	8 Protection against indefinite immersion in water.

NHP Technical News file



To enable you to keep this and subsequent issues of NHP Technical News as a reference source, we have made provision for storing them in the Sprecher + Schuh technical binder, 2200T, which forms part of your catalogue system.

If you do not currently have a divider designated 'NHP Technical News' in your 2200T binder, please contact your local representative or our Marketing Services Department in Melbourne and we will be happy to provide you with one.

**Editorial content: - Please address all enquiries to 'The Editor - 'NHP Technical News'
PO Box 199, Richmond Victoria 3121.**

NHP Electrical Engineering Products Pty Ltd A.C.N. 004 304 812

Melbourne
43 - 67 River Street,
Richmond VIC. 3121
Phone: (03) 429 2999
Fax: (03) 429 1075

Sydney
30 - 34 Day Street North,
Silverwater N.S.W. 2141
Phone: (02) 748 3444
Fax: (02) 648 4353

Brisbane
25 Turbo Drive,
Coorparoo QLD. 4151
Phone: (07) 891 6008
Fax: (07) 891 6139

Adelaide
50 Croydon Road,
Keswick S.A. 5035
Phone: (08) 297 9055
Fax: (08) 371 0962

Perth
38 - 42 Railway Parade,
Bayswater W.A. 6053
Phone: (09) 271 8666
Fax: (09) 272 3906

Newcastle
57 Crescent Road,
Waratah N.S.W. 2298
Phone: (049) 60 2220
Fax: (049) 60 2203

Townsville
62 Leyland Street,
Garbutt QLD. 4814
Phone: (077) 79 0700
Fax: (077) 75 1457

Rockhampton
208 Denison Street,
Rockhampton QLD. 4700
Phone: (079) 27 2277
Fax: (079) 22 2947

Toowoomba
Cnr Carroll Street &
Struan Court,
Toowoomba QLD. 4350
Phone: (076) 34 4799
Fax: (076) 33 1796

Agents
Hobart
H. M. Bamford (Hobart)
199 Harrington Street,
Hobart TAS. 7000
Phone: (002) 34 9299
Fax: (002) 31 1693

Launceston
H. M. Bamford (Launceston)
59 Garfield Street,
Launceston TAS. 7250
Phone: (003) 44 8811
Fax: (003) 44 4069

Darwin
J. Blackwood & Son Ltd
(Inc. Tesco Pearce)
Mataram Street,
Winnellie N.T. 0820
Phone: (089) 84 4255
Fax: (089) 84 3945

