# It's Official: 'ic' is the New 'nL'!

## *But it hasn't reached stores (yet)*

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*Updated: UL 1604 was replaced by ANSI/ISA 12.12.01. References to the UL standard may be read as references to the ANSI/ISA standard instead.*

*Updated: Type 'ic' has been incorporated into the 2011 updates to the National Electrical Code, and various types 'n' ('nR', 'nL', and perhaps others) have been removed from UL / IEC 60079-15 and merged into their 'parent' standards. This trend of moving protection techniques into their 'parent' standard is expected to continue.*

*The original text of this article is still relevant, and is presented below.*

The official word has come down: "non-incendive" devices are on their way out. But what does that mean for users?

For decades, non-incendive devices - known in the international lexicon as type 'n' - have been marketed as solutions for Zone 2 problems. Since most hazardous areas - some say up to 95%[1] - are Zone 2 , they address a fairly large market segment.

Non-incendive devices have been covered under various standards. Like all hazardous location standards, they began as national standards, with different countries adopting completely different documents (UL 1604, C22.2 No. 213, and so forth).

And, like all the others, considerable work has been completed in the last decade to harmonize the standards under the IEC banner: "One standard, one certificate, one mark". The goal is, of course, to reduce cost and complexity by reducing overhead and variation in the design, evaluation and certification of hazardous locations equipment.

As part of this, the IEC defined type 'n' devices to cover non-incendive applications of all kinds. IEC 60079-15 is the standard for all type 'n' certifications.

(For simplicity, let's talk only about the IEC standards, which are the latest fashion. The old non-incendive standards are still around, to be sure, but are no longer the news, and the terminology is confusing enough without adding them to the mix.)

Few will deny that, even under the auspices of the IEC, type 'n' turned into a bit of a mess. It became a hodgepodge of different protection methods that fit nowhere else.

There are, in fact, no less than five distinct types of type 'n' protection, although most people know only four:

* Type 'nA' (Non-sparking)
* Type 'nC' (Non-incendive)
* Type 'nR' (Restricted-breathing)
* Type 'nL' (Energy-limited)
* Type 'nZ/nP' (Pressurization)

Pressurization ('nZ' or 'nP' depending on who you talk to) was a Johnny-come-lately to the party, and never really got anywhere, while 'nC' non-incendive became a catch-all for anything that was not type A, R, L or Z. There are also separate sections for components and particular equipment such as caplights, "non-incendive components" and rotating machines, among other things.

Each technique used different principles and were lumped together in an uncomfortable menagerie, like exotic animals side-by-side in a petting zoo. Weird discrepancies arose as different well-meaning committees attempted to reconcile all of the elements to other standards, further adding to the confusion.

Eventually, people realized that type 'n' techniques borrow heavily from their 'parent' Zone 1 techniques. Type 'nR' is effectively a baby form of flameproof type 'd' design (or possibly pressurized, type ‘p’). Type 'nA' is a lesser form of type 'e' increase safety. 'nL' is, effectively, "I.S. Light" - a more basic, less stringent form of intrinsically safe design, known as type 'i'.

Given this, the logical solution to the unholy mess of type 'n' was to move all of the different techniques to their parent - so that's what was done. One of the first to achieve this move was type 'nL', which was moved into IEC 60079-11 under the name "intrinsically safe 'ic'". As the story goes, the type 'n' committee realized they were out of their league, and passed 'nL' over to the I.S. committee in an "unprecedented" act of sensibility.[2]

The 'ic' nomenclature comes along from the pre-existing terminology for intrinsic safety. In I.S., a type 'ia' devices was the most reliable, while a type 'ib' was still very safe but slightly less than 'ia'. 'ia' is suitable for Zone 0 application, while 'ib' is good for Zone 1. Moving one step further down the scale, for Zone 2 applications only, it only makes sense to call the new technique 'ic'.

So hooray! All is well now - or is it? Well, let's see.

Type 'ic' does make significant improvements over type 'nL'. Achieving consistency with recognized intrinsically safe methods will unquestionably clarify things overall simply from being able to lean on the existing standard. It also helps reconcile discrepancies between 60079-15 (non-incendive) and 60079-14 (installation).[3]

It also makes the standard easier to read - although novices will unquestionably find that hard to believe! A short read through IEC 60079-11 will show, however, that the requirements for 'ic' are much better defined than 'nL'.

*Updated: Actually, those familiar with type 'nL' will note that many things are seemingly left unsaid regarding type 'ic' in 60079-11. It is not known if these items were deliberately omitted or omitted by accident, but some agencies have been applying the 'old' type 'n' criteria regardless. In this sense, the old standards may be a better reference for certain aspects of type 'ic' requirements than the new ones.*

*A new Annex, Annex I, has been proposed to help clarify the application of intrinsically safe requirements to type 'ic'. This Annex has not yet entered service and only exists as committee drafts at time of writing.*

Finally, the inclusion of 'ic' in the intrinsically-safe family allows faster, easier system integration. For example, type 'ic' systems may now be constructed using 'ia' and 'ib' components to form an 'ic' rated system.

Unfortunately, there is a dark lining to this silver cloud. While the IEC has been quick to create and adopt type 'ic', not everyone else is quite as fast.

In Canada, hazardous locations are defined in Rule 18 of the Canadian Electrical Code. Being an IEC country, Canada adopted the Zone system in 1998, and put Class I, Zones 1 and 2 locations into Rule 18-100. The United States decided to wait until 2012 before mandating Zones, although they were introduced earlier in a sort of hybrid transition period as Article 505 of NFPA 70.

Obviously, provision had to be made for what are now 'legacy' Division users - that is, anyone and everyone who has ever installed anything in a hazardous location over the past fifty years! Both Canada and the United States defined Zone 2 and Division 2 equal, allowing Division users to take advantage of Zone techniques.

So type 'ic' is accepted for both Zone AND Division - so far, so good!

Unfortunately, despite all this wonderful progress, neither country has written type 'ic' into their Codes. Intrinsically safe 'ia' and 'ib' are there, as are the different flavors of type 'n'. But 'ic' is nowhere to be found.

And as all electrical installations must comply with the relevant Code, this makes 'ic' an orphan. It's there, but nobody will adopt it.

The 2011 NEC may or may not address this - some sources say yes, others say no. Still, the individual states still have to adopt the NEC after it is published, which can take some years, making the 2008 NEC the champ for now.

This situation will unquestionably be resolved in the future. Rumor has it that more 'n' techniques will be migrated; perhaps type 'nA' will move to a version of 60079-7 increased safety, or type 'nR' into the 60079-1 flameproof, 60079-2 pressurization or 60079-18 encapsulation standard. Eventually the Codes will have to catch up to allow the use of these new techniques.

However, in the meantime, manufacturers need to consider what to do for their Zone 2 certification needs.

The most straightforward approach is to certify to both IEC 60079-15 (type 'nL') and 60079-11 (type 'ic'). This might or might not turn out to be straightforward, depending on how your agency approaches it.

Alternatively, you may be dealing with a specific market or customer that has no difficulty with using type 'ic' equipment. It is the future, after all, and sooner or later it will arrive on shelves. Customer education on the meaning and benefits of 'ic' may pay dividends down the road.

Be careful, however. Some customers still demand Division certifications, and - for whatever reason - will fail to recognize Division-Zone equivalency. In other words, you may find yourself stuck with good old UL 1604 and CSA No 213 for a while yet. Do your market research carefully!

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[1] *Hazardous location lighting information and history.* Retrieved from http://www.hazardouslocation.info/page2.html, August 9, 2011

[2] Towle, C. (2007). The Current State of the IEC Intrinsically Safe Standards. *Proceedings of the Hazardous Areas Conference 2007* http://www.iceweb.com.au/Ex-web/IDC07/The%20Current%20State%20of%20the%20IEC%20Intrinsically%20Safe%20Standards.pdf.

[3] Pepperl & Fuchs, *Energy Limitation nL: Old wine in new bottles?*. Retrieved from http://www.pepperl-fuchs.com/global/en/13611.htm, August 9, 2011

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