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The Intrinsically Safe (FM Approved) ratings can be deciphered?

Intrinsically Safe

“Intrinsically Safe” (IS) and Nonincendive are protection levels for safe operation of electronic equipment in various explosive atmospheres. The hazardous location ratings are divided into Class, Division, and Group to indicate the existence of flammable gases or vapors, ignitable dust, fibers, or filings under normal or unlikely conditions of operation. The concept was developed for safe operation in hazardous areas, particularly around petro-chemicals, flammable gasses and dusts. Factory Mutual approves IS products and requires both the production and repair facilities to be approved by them.

Icom has three models that are Intrinsically Safe with FM approval

The **F50/F60**, **F70/F80**, and analog **F3161/F4161**. They all have the same ratings:

Intrinsically safe: Class I, II and III, Division 1, Groups C, D, E, F and G

Nonincendive: Class I, Division 2, Groups A, B, C and D hazardous locations when used with Icom BP-227FM battery pack. Max. Temp. T3C at 40°

The digital **F3161D/F4161D** is rated slightly differently:

Intrinsically Safe: Class I, II, III, Division 1, Groups D, E, F and G. Max. Temp T3C at 40°C

Nonincendive: Class I, Division 2, Groups A, B, C and D. Max. Temp T3C at 40°C

Decoding the Ratings

Let's break it down to figure out what the codes mean and ultimately where the radios can be used.

Intrinsically Safe vs Nonincendive

A radio termed “intrinsically safe” is designed and certified to eliminate or encapsulate any components that produce sparks or which could generate enough heat to cause an ignition in areas with flammable gasses, dusts or fuels.

Nonincendive radios are incapable of generating thermal or electrical energy sufficient to ignite a volatile atmosphere under normal operating conditions-although sufficient energy for ignition could be generated under fault conditions.

Intrinsically safe radios are incapable of generating thermal or electrical energy sufficient to ignite a volatile atmosphere under either normal **or** abnormal operating conditions. Consequently, intrinsically safe systems have much wider application than their nonincendive counterparts.



Class

Class I Areas in which flammable gases or vapors may be present in sufficient quantities to be explosive or ignitable.

Class II Areas made hazardous by the presence of combustible dust.

Class III Areas in which there are easily ignitable fibers or flyings present, due to the type of material being handled, stored or processed-but in which such fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures.

Divisions

Division 1 - Normal Situation: A hazard is present in the everyday normal production operation or during frequent repair and/or maintenance activity.

Division 2 - Abnormal Situation: Potentially hazardous material is expected to be safely confined within closed containers or closed systems, and will be present in the atmosphere only through accidental rupture, breakage, or abnormal operation.

Groups

Group A, B, C & D Gases and vapors in Class I locations are classified into four groups, by the code A, B, C, and D. These materials are grouped according to the ignition temperature of the substance, its explosion pressure and other flammability characteristics.

Groups E, F & G Combustible dust in Class II locations are classified according to ignition temperature and the conductivity of the hazardous substance.

Group A	Group B	Group C	Group D	Group E	Group F	Group G
Acetylene	Flammable Gas, Flammable Liquid Vapor or Combustible Liquid Vapor, such as Hydrogen	Flammable Gas, Flammable Liquid Vapor or Combustible Liquid Vapor, such as Ethylene	Flammable Gas, Flammable Liquid Vapor or Combustible Liquid Vapor, such as Propane	Atmosphere contains combustible metal dust, including Aluminum, Magnesium and other commercial alloys	Atmosphere contains combustible carbonaceous dust, including Coal, Carbon black, Charcoal, and Coke	Atmosphere contains combustible dust, including Flour, Grain, Wood, Plastic, and Chemical

Where can the radios be used?

In areas where flammable gases, vapors, or dust may be present in sufficient quantities to be explosive in a normal situation the analog radios can safely operate where ethylene, propane, aluminum, coal, or flour, for example, are present. The digital F3161D/F4161D is not rated for Group C, which excludes environments of ethylene class chemicals. In areas where these conditions are not normally present but may be due to an accident, all radios are rated for all types of vapor or dusts.

IS Rated radios can be used by:

- Facilities with dust or vapor explosive atmospheres: grain, woodworking, paper mills
- Weapons, explosives and propulsion testing facilities
- Aircraft or vehicle refuelling operations/airports
- Oil well drilling, oil and gas terminals, refineries, petrochemical plants
- chemical plants, chemical disposal operations
- HAZMAT teams, Bomb disposal teams, First Responders
- Manufacturing: paint, pharmaceuticals