

### Products certified as intrinsic safety explosion-proof construction

When SHINKAWA displacement/vibration transducers are installed in hazardous areas where there is a risk of ignition or explosion, the transducers are designed with a barrier between the transducer and monitor so that ignition or explosion due to equipment shorting, grounding or wire breaking cannot intrinsically occur. Discharged electrical energy in the hazardous area is strictly limited by the intrinsic safety explosion-proof construction.

#### ● Products certified as explosion-proof

Equipment name	RIIS (Conforming to IEC)	RIIS	FM	BASEEFA
VK-202A	Ex ia IIC T6	—	Class I, II, III Division 1 Groups A, B, C, D, E, F, G	EEx ia IIC T5
VK-452A	Ex ia IIC T6	—	Class I, II, III Division 1 Groups A, B, C, D, E, F, G	EEx ia IIC T5
VK-302P	Ex ia IIC T6	—	Class I, II, III Division 1 Groups A, B, C, D, E, F, G	EEx ia IIC T5
VK-602P/143P	—	—	Class I, II, III Division 1 Groups A, B, C, D, E, F, G	EEx ia IIC T5
VK-152R	Ex ia IIC T4	—	—	—
CA-301	Ex ia IIB T3 Ex ia IIC T3 Ex ia IIB T4	—	—	—
SVI-1B/2B/4B/6B/ 8B/10B/15B/25B	—	i3nG4	—	—

#### ● Explosion-proof standards

Shinkawa products are certified as explosion-proof as follows:

RIIS (conforming to IEC) ——— Japan  
 RIIS ——— Japan  
 FM ——— U.S.A.  
 BASEEFA ——— U.K.

### Overview of intrinsic safety

#### ● RIIS (conforming to IEC)•BASEEFA

Classification of intrinsic safety equipment	Exia: *Explosion is prevented for up to two equipment accidents. Equipment can be used in any hazardous area of class 0, class 1 or class 2. Exib: *Explosion is prevented for one equipment accident. Equipment can be used in any area of class 1 or class 2.	Degree of ignition by electric arc	The ignition of electrical equipment is classified according to the name of the mixture which is not ignited depending on the ignition energy generated in an accident. Typical gases are as follows: Group IIC: Hydrogen, acetylene, etc. Group IIB: Ethylene, etc. Group IIA: Propane, etc.
Types of electrical equipment with explosion proof construction.	Group II: Used in hazardous areas of factories or businesses other than in hazardous area of mining pits.	Classification of degree of ignition by surface temperature	The ignition of equipment used in hazardous areas (unless otherwise specified) is classified as follows based on the maximum surface temperature produced when an accident occurs at an ambient temperature of 40°C. T1: 450°C T2: 300°C T3: 200°C T4: 135°C T5: 100°C T6: 85°C
Hazardous atmosphere	Area with explosive atmosphere requiring special construction and use of electrical equipment. (atmosphere where there is a risk of explosion due to mixing of gas or vapor with air)	* EEx ia and EEx ib are used for BASEEFA certification.	
Classification of hazardous areas	Class 0: Explosive atmosphere exists always or for a long period. Class 1: Explosive atmosphere may be generated during normal operation of facilities or equipment. Class 2: Explosive atmosphere is not generated during normal operation of facilities or equipment, or may exist only for a short period.		

#### ● RIIS

Classification of intrinsic safety equipment	ia: Electrical equipment with intrinsic safety construction does not ignite explosive gases during normal operation or even if either one or two accidents occur. ib: Electrical equipment with intrinsic safety construction does not ignite explosive gases during normal operation or if one accident occurs.	Classification of explosion classes	The minimum gap which causes flame propagation at a gap depth of 25mm: 1: More than 0.6mm 2: More than 0.4mm, but less than 0.6mm 3: Less than 0.4mm
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Types of electrical equipment with explosion-proof construction	Equipment used in hazardous areas of factories or businesses.
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Hazardous atmosphere	Atmosphere considered explosive as a result of mixing of explosive gases with air.
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Classification of hazardous areas	Class 0: Area where hazardous atmosphere exists always or for a long period under normal conditions. Class 1: Area where hazardous atmosphere may be generated under normal conditions. Class 2: Area where hazardous atmosphere may be generated under abnormal conditions.
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Classification of ignition temperatures	G1: More than 450°C G2: More than 300°C but less than 450°C G3: More than 200°C but less than 300°C G4: More than 135°C but less than 200°C G5: More than 100°C but less than 135°C G6: More than 85°C but less than 100°C
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Explosion class	Degree of ignition	G1	G2	G3	G4	G5	G6
	1	Acetone Ammonia Carbon monoxide Ethane Acetic acid Ethyl acetate Toluene Propane Benzene Methanol Methane	Ethanol Isopentyl acetate 1-butanol Butanol Acetic anhydride	Gasoline Hexane	Acetaldehyde Ethyl ether		
2	Coal gas	Ethylene Ethylene oxide					
3	Water gas Hydrogen	Acetylene				Carbor disulfide	

● FM

Classification of electrical equipment with explosion-proof construction	Explosion is prevented for up to two equipment accidents. Equipment can be used in Division 1 areas and areas corresponding to this Division.
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Types of electrical equipment with explosion-proof construction	Not classified: However, electrical equipment for coal mines and ships are managed by the relevant supervising organization.
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Classification of hazardous atmosphere	Explosive mixture of air with the following substances: Class I : Gas or vapor Class II : Dust Class III: Fiber, cotton or waste hair
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Classification of hazardous areas	Class I, Division 1: Area where inflammable gases exist or a dangerous gas concentration periodically forms during normal operation. Class I, Division 2: Area where volatile inflammable liquids or inflammable gases are usually enclosed in a fully closed enclosure or system from which the above liquids or gases can be dispersed only under abnormal or accident conditions.
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Classification of degree of ignition by surface temperature	The ignition of equipment used in hazardous areas (unless otherwise specified) is classified as follows based on the maximum surface temperature produced when an accident occurs at an ambient temperature of 40°C: T1: 450°C T2: 300°C T3: 200°C T4: 135°C T5: 100°C T6: 85°C
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Gas classification	Group A: Acetylene Group B: Hydrogen Group C: Ethylene Group D: Propane	Class I
	Group E: Metal dust Group F: Carbon dust Group G: Flour, starch, grain	Class II

Products certified by ship's class standards

Shinkawa displacement/vibration transducers and monitors are installed in ships as part of the marine turbine monitoring system. All marine equipment installed in ships must satisfy the ship's class standard set by the ship owner.

● Ship's class standards

KR \_\_\_\_\_ Korea