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Equipo de respiracion autonomo

El ERA es utilizado habitualmente por los bomberos cuando responden a los incendios. También lo utiliza el personal que trabaja en las plataformas petrolíferas o los trabajadores de industrias como la minería y transporte marítimo cuando el trabajo puede implicar zonas con bajos niveles de oxígeno o donde hay presencia de polvo, humos u otras sustancias nocivas en el aire. Muchos otros industrias o situaciones requieren el uso de ERA siempre que el aire respirable seguro esté comprometido. ¿Cómo se inspecciona el ERA? Teniendo en cuenta la importancia del ERA para ayudar a mantener la seguridad de los trabajadores en su lugar de trabajo, la inspección del ERA implica la comprobación de casi todos los componentes para garantizar su buen estado de funcionamiento. El uso de una lista de comprobación de la inspección del ERA puede ser útil para garantizar que no se pase por alto ninguna pieza y que la inspección del ERA se realice a fondo. ¿Con qué frecuencia debe revisarse el ERA? El ERA debe ser revisado antes de cada uso, durante la limpieza y, por OSHA normas, deben ser revisadas al menos una vez al mes. Los cilindros, un tipo de recipiente a presión utilizado con el ERA, también debe probarse cada tres a cinco años, dependiendo del material. ¿Cuándo debo sustituir las botellas del ERA? Los cilindros del ERA son válidos durante 15 años, siempre que se mantengan adecuadamente. Después de 15 años, los cilindros del ERA deben ser desechados y destruidos para evitar su reutilización. ¿Qué es una lista de comprobación de inspección del equipo de respiración autónomo? La lista de comprobación para la inspección de ERAs sirve como guía paso a paso para inspeccionar los ERAs y sus componentes, como por ejemplo Pieza de la cara Armazón de la espalda y arnés Cilindro Mangueras Presión negativa Regulador Módulo de control Módulo de potencia HUD Avisador de baja presión Rig World Multi Services Pvt Ltd was founded in July 2012 with a goal to be global leader for training and consulting in oil and gas industry. Within a short span of time Rig world expanded its horizon in Middle East countries and started its operations from fahaheel, Kuwait. With our global presence we have served more than 50 companies based in Kuwait, Qatar, UAE, Bahrain etc. for well control, well intervention, HSE etc. training. RigWorld has two state-of-the-art training centers in Ahmedabad, India, and Kuwait. Rigworld aims to cater oil and gas professionals for their skill up gradation and be familiar with the latest technology in industry. A team of experienced instructors and engineers helps the delegates to attain the advanced skills and improve their knowledge. En cualquier empresa del mundo, la seguridad del personal debe ser una prioridad. Diversos sectores industriales y de servicios exigen medidas de protección para sus colaboradores frente a ambientes hostiles que pueden poner en riesgo su salud En este contexto, el equipo de respiración autónomo se convierte en una herramienta indispensable para la seguridad y el bienestar de los colaboradores en situaciones de riesgo. El ERA o Equipo de Respiración Autónomo es un dispositivo diseñado para el trabajo en atmósferas con niveles reducidos de oxígeno y/o presencia de gases tóxicos, muy utilizado por bomberos, equipos de rescate o personal de la industria. Estos equipos incluyen botellas suministradoras de aire, espalderas, reguladores y máscaras de respiración. Los ERA suministran al usuario aire respirable desde un recipiente de aire comprimido o a través de un sistema neumático conectado con mangueras. A la hora de seleccionar un equipo de respiración autónoma, es importante tener en cuenta que se necesita la mayor protección posible con el menor peso posible, para poder realizar el trabajo sin obstáculos. Equipos de respiración autónomo (ERA) para trabajadores industriales y bomberos. Los equipos autónomos para la protección respiratoria de Estel Safety cubren todas las necesidades de industriales, bomberos de empresa y trabajadores del sector naval en trabajos con falta de oxígeno, ambientes tóxicos y/o espacios confinados. Estel Safety cuenta con equipos de respiración autónoma con botellas de acero de 3 y 6 litros; así como con equipos de respiración autónoma con botellas de composite de 6.8, 7 y 9 litros. Equipos autónomos de respiración Los equipos autónomos de respiración son dispositivos que permiten a una persona respirar sin la necesidad de un suministro externo de aire o oxígeno. Estos equipos son utilizados en situaciones de emergencia, por ejemplo, en incendios o en ambientes contaminados, donde el aire es tóxico o no se puede respirar. Estos equipos pueden ser autónomos o conectados a una fuente de suministro externo, y suelen incluir una máscara o boquilla para cubrir la boca y la nariz, y un tanque de aire o una bombona de oxígeno. Equipos de respiración para trabajadores industriales La protección respiratoria es un elemento crucial de seguridad para los trabajadores. En muchos entornos, los contaminantes transportados por el aire pueden suponer un grave riesgo para la salud. Dado que, la inhalación de polvo, humo u otras partículas provocaria daños en los pulmones, infecciones respiratorias e incluso cáncer. Entonces, para poder proteger a los trabajadores de posibles peligros, los empresarios deben proporcionarles equipos de respiración adecuados. Los respiradores filtran las partículas nocivas del aire, permitiendo a los trabajadores respirar con seguridad, en algunos casos, también deben llevar respiradores purificadores de aire, para limpiar el aire de su alrededor. Entonces, mediante una adecuada protección respiratoria, los trabajadores industriales pueden mantenerse seguros y sanos en el trabajo. Equipos de respiración para bomberos Los bomberos están expuestos a una serie de condiciones peligrosas cuando responden a los incendios, exponiéndose al humo, el calor y los restos carbonizados. Entonces, para protegerse de estos peligros, los bomberos utilizan equipos de protección respiratoria, como máscaras de respiración y tanques de aire. El equipo de respiración más común que usan los bomberos es un respirador purificador de aire, que filtra las partículas nocivas. Este tipo de respirador suele combinarse con una capucha de escape, que proporciona protección adicional contra el humo y el calor. Los bomberos también tienen la opción de utilizar un aparato de respiración autónomo, que es una opción más cara pero más fiable que no requiere filtros. Sea cual sea el tipo de aparato de respiración que se utilice, es esencial que los bomberos tengan la formación adecuada para utilizarlo con eficacia. Botellas de aire respirable Las botellas de aire respirable son un componente vital del equipo de cualquier bombero. Sin ellas, los bomberos no podrían trabajar en entornos potencialmente peligrosos y altamente tóxicos. Las botellas de aire respirable proporcionan un suministro constante de aire limpio y oxigenado que permite a los bomberos permanecer alerta y concentrados en su tarea. Además, las botellas de aire respirable están equipadas con filtros especiales que eliminan del ambiente elementos peligrosos como el humo y los gases tóxicos. Mediante el uso de botellas de aire respirable, los bomberos pueden realizar sus tareas de forma eficaz y segura sin exponerse a riesgos innecesarios. Gracias a las botellas de aire respirable, operar en incendios o realizar misiones de rescate es posible sin poner en peligro a los bomberos. Mantenga a los bomberos seguros y protegidos en situaciones de emergencia El sistema especial de filtración elimina los contaminantes del suministro de aire Su construcción robusta y duradera puede soportar condiciones extremas Cumple todos los requisitos de seguridad para su uso por los bomberos Botella de aire comprimido Contiene aire comprimido almacenado a alta presión Gran cantidad de aire disponible Requiere un equipo especializado para el llenado y mantenimiento Botella de aire enriquecido con oxígeno Contiene aire con mayor concentración de oxígeno que el aire ambiente Aumenta la capacidad de respiración y reduce la fatiga Requiere una formación específica para su uso Botella de aire filtrado y purificado Contiene aire filtrado y purificado para eliminar contaminantes Proporciona aire más limpio y seguro para la respiración Puede ser más costosa que otras opciones Botella de aire de emergencia Diseñada para situaciones de emergencia con un suministro limitado de aire Permite una evacuación segura en caso de una emergencia Capacidad limitada de aire disponible Máscaras antigás Durante siglos, las máscaras antigás han sido utilizadas por los bomberos de todo el mundo como una forma de equipo de protección y seguridad. Hoy en día, estas antiguas máscaras antigás son símbolos vivos de la evolución de la tecnología y la seguridad para una de las profesiones más importantes de la sociedad. Además de proporcionar protección contra el humo, el calor y los materiales tóxicos, estas máscaras antigás son famosas por su durabilidad, lo que las convierte en la opción favorita de muchos cuerpos de bomberos de todo el mundo. Evidentemente, su uso regular es testimonio de su valor duradero y de su eficacia para ayudar a los bomberos a realizar su difícil trabajo con mayor seguridad. Protegen a los bomberos de gases y vapores tóxicos peligrosos Fabricados con materiales de alta calidad y tecnología avanzada Diseñados para ser cómodos y fáciles de llevar Equipados con filtros de alta eficacia Características Máscara antigua de media cara Máscara antigua de cara completa Tipo de protección Respiratoria Respiratoria Diseño de la máscara Cubre la nariz y la boca Cubre la nariz, la boca y los ojos Tipo de lente Lente de policarbonato plano Lente de policarbonato curvo Tipo de visor Visor sin tratamiento Visor con tratamiento antivaho Sistema de sujeción Una correa ajustable Dos correas ajustables Material de la máscara Caucho o silicona Caucho o silicona Vida útil de la máscara Aproximadamente 10 años Aproximadamente 10 años Tipo de filtro Filtro de partículas Filtro de partículas y de gas Filtros antigás Los bomberos son esenciales para la seguridad de nuestras comunidades y a menudo se ponen en situaciones peligrosas mientras trabajan para proteger a los demás. Por ello, es fundamental que tengan acceso a máscaras antigás con filtros de gas eficaces que estén equipadas para protegerlos de contaminantes peligrosos como gases tóxicos, humo y partículas. Para garantizar una protección constante contra estos contaminantes, las máscaras antigás deben estar equipadas con filtros antigás que no sólo sean resistentes, sino también resistentes a los daños causados por el sol y a la corrosión. Al proporcionar a los bomberos máscaras antigás y filtros antigás eficaces, podemos garantizar su seguridad a largo plazo durante muchos años. Los filtros de gas para bomberos protegen a los bomberos de la inhalación de gases tóxicos y partículas, permitiéndoles trabajar con seguridad en entornos peligrosos. Los filtros han evolucionado a lo largo de los años para ser más pequeños y ligeros, con tecnología de carbón activo que elimina gases tóxicos como el monóxido de carbono y el dióxido de carbono. El uso de filtros de gas para bomberos permite a los bomberos trabajar con confianza y eficacia en entornos hostiles. Tipo de filtro antigás Descripción Ventajas Desventajas Filtro de carbón activado Este tipo de filtro utiliza carbón activado para absorber gases tóxicos y sustancias químicas. - Es eficaz para la absorción de una amplia variedad de sustancias tóxicas. - Es ligero y fácil de usar. - Tiene una vida útil limitada y debe ser reemplazado con frecuencia. - No es efectivo contra partículas tóxicas o radiactivas. Filtro de partículas Este tipo de filtro utiliza una capa de fibras para capturar partículas tóxicas. - Es efectivo para la filtración de partículas tóxicas, incluyendo humo y ceniza. - Es fácil de usar y mantener. - No es efectivo para la filtración de gases tóxicos o sustancias químicas. - Puede ser pesado y dificultar la respiración Filtro combinado Este tipo de filtro combina un filtro de carbón activado con un filtro de partículas para proporcionar una protección completa. - Es efectivo contra una amplia variedad de sustancias tóxicas y partículas. - Es ligero y fácil de usar. - Tiene una vida útil limitada y debe ser reemplazado con frecuencia. - Puede ser pesado y dificultar la respiración Filtro HEPA Este tipo de filtro utiliza una capa de fibras finas para capturar partículas pequeñas y radiactivas. - Es extremadamente efectivo para la filtración de partículas pequeñas y radiactivas. - No es efectivo para la filtración de gases tóxicos o sustancias químicas. Semimáscaras Las semimáscaras para bomberos son un componente crítico en la seguridad de los bomberos. Estas mascarillas proporcionan una protección muy necesaria contra la inhalación de humo, gases tóxicos y otros contaminantes que los bomberos encuentran en acto de servicio. Las medias máscaras para bomberos constan de dos partes: el cierre de la máscara facial y un filtro. La mascarilla facial se ajusta firmemente a la cara del bombero mientras que el filtro bloquea las partículas y los gases tóxicos antes de que entren en el espacio respiratorio del usuario. Las medias máscaras de bombero no sólo protegen la salud de los bomberos, sino que también sirven para mejorar la visibilidad de su entorno de trabajo, lo que les permite asumir con mayor eficacia las tareas que exigen las máximas precauciones de seguridad. Diseño cómodo y ligero para un uso prolongado Protege contra una amplia gama de gases y vapores tóxicos Construcción duradera para mayor seguridad y larga vida útil Equipado con filtros de alta eficacia Tipo de semimáscara Descripción Ventajas Desventajas Semimáscara con filtros intercambiables Este tipo de semimáscara permite al usuario intercambiar los filtros para adaptarse a diferentes situaciones. - Mayor versatilidad en cuanto a los filtros que se pueden utilizar. - Mayor complejidad en cuanto al mantenimiento y reemplazo de los filtros. Semimáscara con filtros fijos En este tipo de semimáscara, los filtros están fijos en su lugar. - Menos piezas móviles que puedan fallar. - Requiere menos mantenimiento en cuanto a la sustitución de filtros. - Limitaciones en cuanto a los tipos de filtros disponibles. - No se puede cambiar el filtro si se obstruye o se contamina. Semimáscara con suministro de aire Estas semimáscaras proporcionan aire fresco al usuario mediante un tubo conectado a una fuente de aire externa, como una bomba o un compresor. - No se requieren filtros. - Requiere una fuente de aire externa, lo que puede limitar la movilidad del usuario. Equipos de escape Los bomberos necesitan el equipo de escape adecuado para garantizar su seguridad cuando responden a escenas peligrosas. Estos sistemas de escape les proporcionan el aire fresco que necesitan, incluso en situaciones extremadamente difíciles y peligrosas. Además, los equipos de escape, como las mascarillas faciales con boquilla, ayudan a proteger a los bomberos contra las partículas tóxicas y los contaminantes suspendidos en el aire que pueden estar presentes en los lugares de incendios o catástrofes. Los sistemas de escape que se ofrecen hoy en día también están diseñados para satisfacer necesidades específicas, ya que los distintos tipos proporcionan múltiples niveles de protección frente a la inhalación de aire peligroso o contaminado. Los bomberos pueden estar seguros de que con el equipo de escape adecuado en su lugar, pueden completar con seguridad las operaciones de rescate con mayor precisión y eficiencia. Garantiza una vía de escape segura en situaciones de emergencia Rápido y fácil de usar Compacta y ligera para facilitar su transporte Adecuado para una gran variedad de aplicaciones Mostrando 1-11 de 11 artículo(s) Flexible LMS Solutions: Leverage our top-rated Learning Management System (LMS) with access to all training records and advanced reporting, or integrate easily with your existing platform Personalized Support: Benefit from a dedicated account team providing support for implementation and ongoing management Corporate Incentives: Receive custom pricing and flexible payment options tailored to your business needs OSHA, the Occupational Safety and Health Administration, was created in 1970 to prevent dangerous working conditions. They require workers to complete safety compliance training courses covering lessons on eliminating or diminishing occupational injury, illness, and death to achieve this goal. OSHA.com online courses are here to assist U.S. employers in staying compliant with training obligations outlined in OSHA Standards. Note: There is technically no such thing as “OSHA certification.” By completing an OSHA Outreach Training Program course, graduates earn either a 10-hour or 30-hour OSHA DOL card. OSHA training is becoming mandatory in more states and industries every day. Online training is the most convenient way to take OSHA-authorized training. Enroll online, complete the training at your own pace, and receive your certificates and cards online or in the mail. OSHA Outreach courses are provided in partnership with 360training.com, an OSHA-authorized online Outreach Provider. OSHA.com is a privately-owned website that is not affiliated with any government agency. While OSHA does not officially "certify" individuals, you can earn a 10-hour or 30-hour OSHA DOL card by completing an authorized OSHA Outreach Training course. To do so, you must: Enroll in a course through an OSHA-authorized training provider like us. Complete the curriculum, which covers essential topics in workplace safety. Pass the final exam to demonstrate your understanding of the material. Receive a certificate of completion immediately, with your official DOL card arriving within approximately two weeks. U.S. rating of respirators NIOSH air filtration ratingA 1996 NIOSH publication detailing the changes to respirator regulation after 42 CFR 84.(Read on Wikisource)Other name(s)NIOSH ratingsRegulated byNational Institute for Occupational Safety and HealthRegulation30 CFR 11, 42 CFR 84, ANSI Z88.7-2001[edit on Wikidata] This article is part of a series onRespirators in theUnited States and Canada US executive agencies involved Summary USBM (until 1969) MESA (until 1978) MSHA (until 1995/1998) OSHA NIOSH Non-government bodies ANSI AIHA CSA NFPA Canadian ministries and departments Labour Program (ESDC) CCOHS Respirator regulation N95 NIOSH ratings ANSI Z88.2 ANSI K13.1-1973 CSA Z94.4 CSA Z94.4.1 OSH Act (US) Diseases mitigated by respirators Silicosis Asbestosis lawsuits TB SARS COVID-19 mental health Avian flu Misuse N95 use during pandemics Counterfeit respirators Design Failure to use Beards Hierarchy of hazard controls Related topics involving respirators Hawks Nest Tunnel disaster Source control Self-contained breathing apparatus Chemical cartridge Elastomeric Disposable HBM Interwiki links Related media at Wikimedia Commons: Category:42 CFR Part 84 Category:30 CFR Part 11 Works on the topic NIOSH at Wikisource Works on the topic OSHA at Wikisource Selected works: Respirators: Your TB Defense 30 CFR 11 performance evaluation draft 42 CFR 84 guide NIOSH health care press release Counterfeit air-line respirators Gas mask fact sheet For firefighters: SCBA cylinder advisory Terrorism and CBRN meeting, 2001 NIOSH FFFIPP flashover postmortem vte The NIOSH air filtration rating is the U.S. National Institute for Occupational Safety and Health (NIOSH)'s classification of filtering respirators. The ratings describe the ability of the device to protect the wearer from solid and liquid particulates in the air. The certification and approval process for respiratory protective devices is governed by Part 84 of Title 42 of the Code of Federal Regulations (42 CFR 84). Respiratory protective devices so classified include air-purifying respirators (APR) such as filtering facepiece respirators and chemical protective cartridges that have incorporated particulate filter elements. The NIOSH-provided classifications only cover the filtration of particles or aerosols, not the air-purifying respirator's ability to remove chemical gasses and vapors from air, which is regulated under 42 CFR 84 Subpart L. For chemical cartridge classifications, NIOSH, under 42 CFR 84, partially defers to American National Standard ANSI K13.1-1973. All classifications assume that the respirator is properly fitted. During the COVID-19 pandemic, the mask and respirator market rapidly grew, along with counterfeit respirators.[1] NIOSH, on behalf of the Department of Health and Human Services, filed a trademark application on June 17, 2020, for various 42 CFR 84 trademarks, including the N95, allowing NIOSH to enforce rules on counterfeit masks outside of rules defined in 42 CFR 84.[2][3] The trademarks were registered in 2022.[4] It is illegal in the United States to use filtration terms coined under 42 CFR 84, or mark masks with the word "NIOSH" without the approval of NIOSH. Information about approved respirators can be found in the NIOSH certified equipment list (CEL).[5] This section is an excerpt from N95 respirator § Early US respirator standards.[edit] Prior to the 1970s, respirator standards were under the purview of the US Bureau of Mines (USBM). An example of an early respirator standard, Type A, established in 1926, was intended to protect against mechanically generated dusts produced in mines. These standards were intended to obviate miner deaths, noted to have reached 3,243 by 1907. However, prior to the Hawks Nest Tunnel disaster, these standards were merely advisory, as the USBM had no enforcement power at the time.[6] After the disaster, an explicit approval program was established in 1934, along with the introduction of combination Type A/B/C respirator ratings, corresponding to Dusts/Fumes/Mists respectively, with Type D blocking all three, under 30 CFR 14 Schedule 21.[7] The Federal Coal Mine Health and Safety Act establishing MESA (later MSHA),[8] the Occupational Safety and Health Act of 1970, establishing NIOSH,[9] as well as other regulations established around the time, reshuffled regulatory authority for respirators, and moved regulations from Part 14 to Part 11 by 1972,[N2] but nonetheless continued the use of USBM-era regulations.[7] Example Part 11 HEPA Label, TC-21C particulate, with approval for Dusts, Fumes, Mists, radionuclides, and asbestos 3M 6200 with magenta 'Dust-Fume-Mist Radionuclides Asbestos' (30 CFR HEPA) markings on the filters Prior to the approval of 42 CFR 84, MSHA and NIOSH approved respirators under 30 CFR 11. Non-powered respirator filters were classified based on their design against a contaminant, including substances like Dusts, Fumes, Mists, radionuclides, and asbestos. Dust/Mist was usually tested with silica, and Fume was usually tested with lead fume. The most popular respirator filters were often referred to as DM (Dust/Mist) or DFM (Dust/Fume/Mist) in CDC and NIOSH literature as shorthand.[10] Non-powered filters were also classified under the HEPA specification, if applicable.[11] Only 30 CFR 11 HEPA filters were permitted by NIOSH for the prevention of tuberculosis[C3] and asbestos-related diseases.[CF1] NIOSH was concerned about users choosing inappropriate respirators, like confusion over choosing DM or DFM respirators with regards to particle penetration, so proposed Part 84 rules in 1994 dropped the contaminant/HEPA classification for most respirators in favor of three specifications, Type A, B and C, each representing filtration of 99.97%, 99%, and 95% respectively, with Type A proposed to be used in place of HEPA for non-powered respirators.[C1][11] In 1973, the Los Alamos National Laboratory (LANL) recommended NIOSH use NaCl aerosol to test DM and DFM filters. Results from those tests showed significant leakage, with efficiency levels measured at around 75% to 90%.[12] LANL noted that lead fume would plug the tested filters, increasing the apparent filtration efficiency of the filter.[13] (OBSOLETE) 30 CFR 11 efficiency levels[11][14] Particulate Respiratorapproval Maximumdust penetration Minimumefficiency level Permitted forTB Permitted forasbestos 158.4 mg silica7.92 m3 (280 cu ft) air Single-use Dust/Mist filters 1.8 mg 98.86% No No 158.4 mg, usually silica7.92 m3 (280 cu ft) air Replaceable Dust/Mist filters 1.5 mg 99.05% No No 0.3 micron DOP0.05 mg per cubic meter air for particles HEPA (includesDust/Mist approval)[ND3] N/A 99.97% Yes Yes This paragraph is an excerpt from N95 respirator § 42 CFR 84.[edit] On July 10, 1995, in response to respirators exhibiting "low initial efficiency levels", new 42 CFR 84 standards, including the N95 standard, were enforced under a three-year transition period,[C4] ending on July 10, 1998.[N2] The standard for N95 respirators includes, but is not limited to, a filtration of at least 95% under a 0.3 micrometer[C4] 200 milligram test load of sodium chloride. Standards and specifications are also subject to change.[15][N2] Once 42 CFR 84 was in effect, MSHA, under a proposed rule change to 30 CFR 11, 70, and 71, would withdraw from the approval process of rated respirators (outside of respirators used for mining).[C1][16] This article is about the Part 84 respirator regulation enacted in 1995 and is not to be confused with the older, 1973 Part 84 regulation for colorimetric detector tubes,[17] which will not be discussed here. Example Part 84 Label, TC-84A particulate, with older NIOSH logo, for P100 respirator, equivalent to Part 11 HEPA. People wearing 3M 2091 magenta P100 filters. Note that these filters do not block vapors. Under the current revision of Part 84 established in 1995, NIOSH established nine classifications of approved particulate filtering respirators based on a combination of the respirator series and efficiency level. The first part of the filter's classification indicates the series using the letters N, R, or P to indicate the filter's resistance to filtration efficiency degradation when exposed to oil-based or oil-like aerosols (e.g., lubricants, cutting fluids, glycerine, etc.).[CF2][18][N2] Definitions and intended use for each series is indicated below.[19] N for not resistant to oil. Used when oil particulates are not present. Tested using sodium chloride particles. R for resistant to oil. Used when oil particulates are present and the filter is disposed of after one shift. Tested using dioctyl phthalate (DOP) oil particles. P for oil-proof. Used when oil particulates are present and the filter is re-used for more than one shift. Tested with DOP oil particles. The second value indicates the minimum efficiency level of the filter. When tested according to the protocol established by NIOSH each filter classification must demonstrate the minimum efficiency level indicated below. NIOSH particulate respirator class minimum efficiency levels[CF2] Particulate Respirator class Minimum efficiencylevel Permitted forTB Permitted forasbestos NaCl (N) or DOP (R,P) N95, R95, P95 95% Yes No N99, R99, P99 99% N100, R100, P100 99.97% Yes All respirator types are permitted for TB.[20][C1] Class-100 filters can block asbestos.[21][CF1][S2] For N type filters, a 200 mg load of NaCl is used, with an undefined service time. For R type filters, a 200 mg of DOP is used, with a defined service time of "one work shift". For P type filters, an indefinite amount of DOP is used until filtration efficiency stabilizes.[N2] P100 filters, under 42 CFR part 84, are the only filters permitted to be magenta in color.[22] HE (high-efficiency) labeled filters (described in the subsection) are only provided for powered air-purifying respirators. HE-marked filters are 99.97% efficient against 0.3 micron particles and are oil-proof.[23][24][25] Since filters are tested against the by definition most penetrating particle size of 0.3 µm, an APR with a P100 classification would be at least 99.97% efficient at removing particles of this size.[N2] Particles with a size both less than and greater than 0.3 µm may be filtered at an efficiency greater than 99.97%.[N2] However, this may not always be the case, as the most penetrating particle size for N95s was measured to be below 0.1 µm, as opposed to the predicted size of between 0.1 and 0.3 µm.[26] A person wearing a powered air-purifying respirator This section is an excerpt from Powered air-purifying respirator § 42 CFR 84.[edit] 42 CFR 84, from 1995 to 2020, copies 30 CFR 11 rules for PAPRs.[N2] The following table lists the air flow requirements for NIOSH-approved PAPRs under Part 84.175. Tight-fitting PAPRs may be fit tested with the facepiece unpowered and in negative-pressure (under 29 CFR 1910.134) while loose-fitting PAPR fit test protocols have not been changed from 30 CFR 11.[CF2] Part 84 air flow requirements Facepiece Air flow inliters/minute Tight-fitting 115 Loose-fitting 170 The following table lists the ratings for particulate ratings for Part 84 PAPRs.[CF2] PAPR100 ratings were added in 2020.[CF3] NIOSH particulate classes for powered air-purifying respirators Particulate Respiratorclass Minimumefficiency level Permitted forTB Permitted forasbestos[CF1] 0.3 micron DOP HEPA or HE 99.97% Yes Yes 0.075 to 1.86 micron NaCl PAPR100-N Ratingdiscontinued Not yetdefined 0.075 to 1.86 micron DOP PAPR100-P PAPR100-N is not designed to filter oil particulates, and the official color-coding for all three respirator types is magenta.[CF2] A study has demonstrated that users carrying out physical work at intensities 80-85% VO2 max "over-breathe" loose-fitting PAPRs and has recommended an increase of air flow to 400 lpm, an approximately two-fold increase over NIOSH-approved values.[27] See also: Chemical cartridge and Gas mask Half-face air-purifying respirator with combination P100 particulate filter (magenta) and organic vapor (black) cartridge Under 42 CFR 84, chemical cartridges and gas mask canisters are defined separately. Use of the TC-14G canister schedule or the TC-23C chemical cartridge schedule for a given respirator depends on whether "acid gas" is a designated contaminant, which is designated for gas mask canisters only, or if the manufacturer is obligated to list all designated contaminants supported by a given chemical cartridge.[ND2] 42 CFR 84 Subsection L describes seven types of chemical cartridge respirators with maximum use concentrations and penetration, noting that colors and markings are definitively based on ANSI K13.1-1973.[CF2] A TB guide, published by NIOSH in 1999, describes 13 combinations of contaminants with unique color markings.[20] The definitive guide from ANSI, who, since the passage of 42 CFR 84 in 1995, has published a 2001 revision of K13.1-1973, named Z88.7-2001, describes 14 combinations of contaminants with unique color markings, based on 13 out of the 28 NIOSH Protection Designations.[S1][ND1] The ANSI standard also notes that these classifications do not apply in aviation or military respirators.[S1] A comparison table below that details the NIOSH protection designations,[ND1] 42 CFR 84,[CF2] the Navy/Marine Field Manual,[28] the NIOSH TB guide,[20] and whether they match up with the (42 CFR 84-declared ANSI K13.1-1973 revision) ANSI Z88.7-2001 colors,[S1] for each type of chemical cartridge is described below. Note that, while the 2001 revision to ANSI K13.1-1973 provides exact colors under the Munsell Color System,[S1] colors and combinations outside the public domain, as well as cartridge/canister designation, have been omitted to facilitate this fair use comparison: Respirator/Filter type designation and color comparison[a] NIOSH protection designations[ND1] NIOSH protection abbreviation[ND1] 42 CFR 84 max use concentration[CF2][a] Penetration allowed by 42 CFR 84[a] Efficiency level[a] 1999 NIOSH TB Guide color[20] Correlated with Z88.7-2001 (K13.1-1973 revision)?[S1] Acid gas (gas mask only)[ND1] AG N/A White Yes, for canisters only Ammonia AM 300 ppm 50 ppm 83.3% Green Yes Chlorine dioxide CD N/A In standard as combination Chlorine CL 10 ppm 5 ppm 50% White with 1/2" yellow stripe No stripe, but within designation color Chloroacetophenone CN N/A Carbon monoxide CO N/A Blue Yes Chlorobenzylidene malononitrile CS N/A Ethylene oxide EO Formaldehyde FM Hydrogen chloride HC 50 ppm 5 ppm 90% N/A In standard as combination Hydrogen fluoride HF N/A In standard as combination Hydrogen cyanide HN N/A White, with 1/2" green stripe No stripe, wrong color, actual color for unlisted combinations Hydrogen sulfide HS N/A In standard as combination (escape only) Methylamine MA 100 ppm 10 ppm 90% N/A In standard with ammonia Mercury vapor MV N/A Nitrogen dioxide ND Organic Vapor OV 1000 ppm or lower 5 ppm Depends Black Yes Phosphine PH N/A Sulfur dioxide SD 50 ppm 5 ppm 90% N/A In standard as combination Vinyl chloride VC 10 ppm 1 ppm 90% N/A NIOSH designation does not exist, may use unlisted combination color Toluene diisocyanate TDI N/A Demand (SCBA) DE Non-air-purifying respirators (Atmosphere-supplying respirators) Pressure Demand (SCBA) PD Supplied-air (Air-line) SA Supplied-air Abrasive Blast SB Self-Contained (SCBA) SC Escape (SCBA) ESC Purple Part 11 HEPA respirator with MSHA/NIOSH emblems Respirator combination designation and color comparison[a] NIOSH protection abbreviation[ND1] Color Correlated with Z88.7-2001 (K13.1-1973 revision)?[S1] 1999 NIOSH TB Guide combinations[20] Any of above chemicals/ Particulates Gray stripe Wrong color, no stripe HN/Chloropicrin Yellow with 1/2" blue stripe NIOSH designation does not exist, no stripe, wrong color, actual color for unlisted combinations Radionuclides Purple/Magenta Yes, under 30 CFR 11 HEPA AG/HN/CL/OV/AM/CO/ Chloropicrin/ radionuclides/ particulate Red with 1/2" gray stripe No stripe needed, combination more than required for color (AG/OV/AM/CO) AG/AM Green with 1/2" white stripe No stripe, wrong color, actual color for unlisted combinations AG/OV Yellow Yes, for canisters only AG/OV/AM Brown Yes, for canisters only Navy/Marine Field Manual combinations[28][b] "Acid Gases": CL/CD/HS/HC/SD/HF White Combination more than required for color (CL/HC/SD) "Organic Vapors": Xylene/Toluene Brown Within designation color, but wrong color if exclusive "Basic gases": AM/MA Green Yes FM Tan Within designation color, but actual color for unlisted combinations MV Orange NIOSH designation does not exist, wrong color, actual color for unlisted combinations HEPA Purple Yes ^ a b c d e See the NIOSH pocket guide for additional respirator use guidelines. Breakthrough concentration times can be calculated through the NIOSH MultiVapor tool, or OSHA math models. ^ For brevity, only combinations that are different from the TB guide are listed. Person wearing purple 3M 7093 P100 cartridge filters For particulate respirators, while NIOSH designates P100 as filter cartridges that can use the "magenta" color, ANSI designates P100 as "purple", a color which can be seen on some P100 filter cartridges. In addition, the 2001 revision to ANSI K13.1-1973 provides exclusive colors to be used for non-P100 cartridge filters, in two categories: oil-resistant (remaining R- and P- NIOSH ratings), and non-oil resistant (all N-ratings).[S1] By definition, ANSI Z88.2-2015 considers N100, R100, P100, and HE as HEPA filters.[S2] "TC-84A" redirects here. For information on TC-84A N95-class respirators, see N95 respirator.Screenshot of the NIOSH CEL, dated September 30, 2001, with the six respirator schedules NIOSH is the current regulator of all the respirators in this schedule, under 42 CFR 84.[C1] 'BM' stands for the US Bureau of Mines, the historical regulator of respirators in the United States. Approval schedules[28][ND2] US Code Gas mask(Canister[ND2]) Air-line SCBA Particulate PAPR ChemicalCartridge BM BM-14 BM-19 BM-13 BM-21 N/A BM-23 30 CFR 11 TC-14G TC-19C TC-13F TC-21C TC-21C TC-23C 42 CFR 84 (enacted) TC-14G TC-19C TC-13F TC-84A TC-21C TC-23C TC-21C respirator approval numbers for negative-pressure particulate respirators have three digits, in the form: TC-21C-###, while TC-84A respirator approval numbers have four digits, in the form: TC-84A-####.[29] 42 CFR 84 (until 2020) did not change regulation regarding powered-air purifying particulate respirators, so have continued under TC-21C approval, with four digits, in the form TC-21C-####.[N2] These paragraphs are an excerpt from National Institute for Occupational Safety and Health § NIOSH Certified Equipment List.[edit] NPPTL is the designated publisher of the NIOSH Certified Equipment List, or CEL. The CEL is a public domain database that details the respirators currently approved by NIOSH, and is ordered separated based on type of respirator, which is designated with a schedule (e.g. TC-84A).[30] The CEL was initially released in paper form on September 30, 1993. However, due to low usage of the paper CEL, as well as the increasing number of respirators approved by NIOSH, a Microsoft Access-based version of the CEL was released.[31] Initial releases of the CEL had hose and pressure information for air-line respirators. This information had been eliminated due to concerns over users prioritizing the CEL over respirator documentation.[31] Main article: Respirator § Issues NIOSH air filtration ratings do not test the fit of a respirator. Fit testing is required by OSHA for employers when a hazard is present, and voluntary respirator use under Appendix D is not allowed due to the hazard.[32][C5] Rules for fit testing are also defined by ANSI Z88.2. Z88.2 notes that, in Canada, respirator care and fit testing are defined by CSA Z94.4.[S2][S3] Classic collection efficiency curve with filter collection mechanisms A few other jurisdictions use standards similar to the NIOSH scheme to classify mechanical filter respirators. They include: China (GB 2626-2019): Similar testing requirements and grades. Has "KN" and "KP" resistance levels, 90/95/99. Has additional EU-like rules on leakage. Mexico (NOM-116-2009): Same grades. South Korea (KMOEL - 2017-64): EU grades, KF 80/94/99 for second/first/special Aerosol Division of Industrial Hygiene N95 respirator NIOSH European respirator standards

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CDC NIOSH. 1992. pp. 62–63. ^ "...the lead oxide fume particulate load into a respirator filter is quite large and causes significant plugging of the filter..."[S4] ^ "Dust, Mist (DM) respirators are labeled as "permissible respirator for dusts and mists or approved for respiratory protection against dust and mists having a time-weighted average not less than 0.05 milligram per cubic meter or 2 million particles per cubic foot".[ND3] ^ Note: the following source cites July 1, 1998 as the end date for the transition period, contradicting official NIOSH publications. Herring Jr., Ronald N. (1997). "42 CFR Part 84: It's time to change respirators... but how?". Engineer's Digest. pp. 14–23. ^ "Changes in Occupational Safety Regs Will Permit Better Respirators to Protect Against Dust and Disease" (Press release). NIOSH. 2 June 1995. 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Related media at Wikimedia Commons: A Performance Evaluation of DM and DFM Filter Respirators Certified for Protection Against Toxic Dusts, Fumes, and Mists WORKING DRAFT Texts on Wikisource: Addendum to the NIOSH 42 CFR 84 guide:[N2] NIOSH Service Time Recommendations for P-Series Particulate Respirators Voluntary Program for Acceptance of Applications for the Testing and Evaluation of Full-Facepiece Air Purifying Respirators (APR) for Use Against Chemical, Biological, Radiological and Nuclear (CBRN) Agents Announcement of Public Meeting to Discuss Potential Standards or Guidelines for Respiratory Protective Devices Used to Protect Emergency Response Workers Against Chemical Papers on Part 11 Chen, Chih-Chieh; Willeke, Klaus (1992). "Aerosol penetration through surgical masks". American Journal of Infection Control. 20 (4): 177–184. doi:10.1016/S0196-6553(05)80143-9. PMID 1524265. Bullock, William H.; Laird, Larry T. (1994). 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NIOSH Certified Equipment List (CEL) NIOSH Pocket Guide NIOSH MultiVapor program NIOSH GasRemove (beta) OSHA math model tool for replacement of chemical cartridges Retrieved from " 2U.S. rating of respirators NIOSH air filtration ratingA 1996 NIOSH publication detailing the changes to respirator regulation after 42 CFR 84.(Read on Wikisource)Other name(s)NIOSH ratingsRegulated byNational Institute for Occupational Safety and HealthRegulation30 CFR 11, 42 CFR 84, ANSI Z88.7-2001[edit on Wikidata] This article is part of a series onRespirators in theUnited States and Canada US executive agencies involved Summary USBM (until 1969) MESA (until 1978) MSHA (until 1995/1998) OSHA NIOSH Non-government bodies ANSI AIHA CSA NFPA Canadian ministries and departments Labour Program (ESDC) CCOHS Respirator regulation N95 NIOSH ratings ANSI Z88.2 ANSI K13.1-1973 CSA Z94.4 CSA Z94.4.1 OSH Act (US) Diseases mitigated by respirators Silicosis Asbestosis lawsuits TB SARS COVID-19 mental health Avian flu Misuse N95 use during pandemics Counterfeit respirators Design Failure to use Beards Hierarchy of hazard controls Related topics involving respirators Hawks Nest Tunnel disaster Source control Self-contained breathing apparatus Chemical cartridge Elastomeric Disposable HBM Interwiki links Related media at Wikimedia Commons: Category:42 CFR Part 84 Category:30 CFR Part 11 Works on the topic NIOSH at Wikisource Works on the topic OSHA at Wikisource Selected works: Respirators: Your TB Defense 30 CFR 11 performance evaluation draft 42 CFR 84 guide NIOSH health care press release Counterfeit air-line respirators Gas mask fact sheet For firefighters: SCBA cylinder advisory Terrorism and CBRN meeting, 2001 NIOSH FFFIPP flashover postmortem vte The NIOSH air filtration rating is the U.S. National Institute for Occupational Safety and Health (NIOSH)'s classification of filtering respirators. The ratings describe the ability of the device to protect the wearer from solid and liquid particulates in the air. The certification and approval process for respiratory protective devices is governed by Part 84 of Title 42 of the Code of Federal Regulations (42 CFR 84). Respiratory protective devices so classified include air-purifying respirators (APR) such as filtering facepiece respirators and chemical protective cartridges that have incorporated particulate filter elements. The NIOSH-provided classifications only cover the filtration of particles or aerosols, not the air-purifying respirator's ability to remove chemical gasses and vapors from air, which is regulated under 42 CFR 84 Subpart L. For chemical cartridge classifications, NIOSH, under 42 CFR 84, partially defers to American National Standard ANSI K13.1-1973. All classifications assume that the respirator is properly fitted. During the COVID-19 pandemic, the mask and respirator market rapidly grew, along with counterfeit respirators.[1] NIOSH, on behalf of the Department of Health and Human Services, filed a trademark application on June 17, 2020, for various 42 CFR 84 trademarks, including the N95, allowing NIOSH to enforce rules on counterfeit masks outside of rules defined in 42 CFR 84.[2][3] The trademarks were registered in 2022.[4] It is illegal in the United States to use filtration terms coined under 42 CFR 84, or mark masks with the word "NIOSH" without the approval of NIOSH. Information about approved respirators can be found in the NIOSH certified equipment list (CEL).[5] This section is an excerpt from N95 respirator § Early US respirator standards.[edit] Prior to the 1970s, respirator standards were under the purview of the US Bureau of Mines (USBM). An example of an early respirator standard, Type A, established in 1926, was intended to protect against mechanically generated dusts produced in mines. These standards were intended to obviate miner deaths, noted to have reached 3,243 by 1907. However, prior to the Hawks Nest Tunnel disaster, these standards were merely advisory, as the USBM had no enforcement power at the time.[6] After the disaster, an explicit approval program was established in 1934, along with the introduction of combination Type A/B/C respirator ratings, corresponding to Dusts/Fumes/Mists respectively, with Type D blocking all three, under 30 CFR 14 Schedule 21.[7] The Federal Coal Mine Health and Safety Act establishing MESA (later MSHA),[8] the Occupational Safety and Health Act of 1970, establishing NIOSH,[9] as well as other regulations established around the time, reshuffled regulatory authority for respirators, and moved regulations from Part 14 to Part 11 by 1972,[N2] but nonetheless continued the use of USBM-era regulations.[7] Example Part 11 HEPA Label, TC-21C particulate, with approval for Dusts, Fumes, Mists, radionuclides, and asbestos 3M 6200 with magenta 'Dust-Fume-Mist Radionuclides Asbestos' (30 CFR HEPA) markings on the filters Prior to the approval of 42 CFR 84, MSHA and NIOSH approved respirators under 30 CFR 11. Non-powered respirator filters were classified based on their design against a contaminant, including substances like Dusts, Fumes, Mists, radionuclides, and asbestos. Dust/Mist was usually tested with silica, and Fume was usually tested with lead fume. The most popular respirator filters were often referred to as DM (Dust/Mist) or DFM (Dust/Fume/Mist) in CDC and NIOSH literature as shorthand.[10] Non-powered filters were also classified under the HEPA specification, if applicable.[11] Only 30 CFR 11 HEPA filters were permitted by NIOSH for the prevention of tuberculosis[C3] and asbestos-related diseases.[CF1] NIOSH was concerned about users choosing inappropriate respirators, like confusion over choosing DM or DFM respirators with regards to particle penetration, so proposed Part 84 rules in 1994 dropped the contaminant/HEPA classification for most respirators in favor of three specifications, Type A, B and C, each representing filtration of 99.97%, 99%, and 95% respectively, with Type A proposed to be used in place of HEPA for non-powered respirators.[C1][11] In 1973, the Los Alamos National Laboratory (LANL) recommended NIOSH use NaCl aerosol to test DM and DFM filters. Results from those tests showed significant leakage, with efficiency levels measured at around 75% to 90%.[12] LANL noted that lead fume would plug the tested filters, increasing the apparent filtration efficiency of the filter.[13] (OBSOLETE) 30 CFR 11 efficiency levels[11][14] Particulate Respiratorapproval Maximumdust penetration Minimumefficiency level Permitted forTB Permitted forasbestos 158.4 mg silica7.92 m3 (280 cu ft) air Single-use Dust/Mist filters 1.8 mg 98.86% No No 158.4 mg, usually silica7.92 m3 (280 cu ft) air Replaceable Dust/Mist filters 1.5 mg 99.05% No No 0.3 micron DOP0.05 mg per cubic meter air for particles HEPA (includesDust/Mist approval)[ND3] N/A 99.97% Yes Yes This paragraph is an excerpt from N95 respirator § 42 CFR 84.[edit] On July 10, 1995, in response to respirators exhibiting "low initial efficiency levels", new 42 CFR 84 standards, including the N95 standard, were enforced under a three-year transition period,[C4] ending on July 10, 1998.[N2] The standard for N95 respirators includes, but is not limited to, a filtration of at least 95% under a 0.3 micrometer[C4] 200 milligram test load of sodium chloride. Standards and specifications are also subject to change.[15][N2] Once 42 CFR 84 was in effect, MSHA, under a proposed rule change to 30 CFR 11, 70, and 71, would withdraw from the approval process of rated respirators (outside of respirators used for mining).[C1][16] This article is about the Part 84 respirator regulation enacted in 1995 and is not to be confused with the older, 1973 Part 84 regulation for colorimetric detector tubes,[17] which will not be discussed here. Example Part 84 Label, TC-84A particulate, with older NIOSH logo, for P100 respirator, equivalent to Part 11 HEPA. People wearing 3M 2091 magenta P100 filters. Note that these filters do not block vapors. Under the current revision of Part 84 established in 1995, NIOSH established nine classifications of approved particulate filtering respirators based on a combination of the respirator series and efficiency level. The first part of the filter's classification indicates the series using the letters N, R, or P to indicate the filter's resistance to filtration efficiency degradation when exposed to oil-based or oil-like aerosols (e.g., lubricants, cutting fluids, glycerine, etc.).[CF2][18][N2] Definitions and intended use for each series is indicated below.[19] N for not resistant to oil. Used when oil particulates are not present. Tested using sodium chloride particles. R for resistant to oil. Used when oil particulates are present and the filter is disposed of after one shift. Tested using dioctyl phthalate (DOP) oil particles. P for oil-proof. Used when oil particulates are present and the filter is re-used for more than one shift. Tested with DOP oil particles. The second value indicates the minimum efficiency level of the filter. When tested according to the protocol established by NIOSH each filter classification must demonstrate the minimum efficiency level indicated below. NIOSH particulate respirator class minimum efficiency levels[CF2] Particulate Respirator class Minimum efficiencylevel Permitted forTB Permitted forasbestos NaCl (N) or DOP (R,P) N95, R95, P95 95% Yes No N99, R99, P99 99% N100, R100, P100 99.97% Yes All respirator types are permitted for TB.[20][C1] Class-100 filters can block asbestos.[21][CF1][S2] For N type filters, a 200 mg load of NaCl is used, with an undefined service time. For R type filters, a 200 mg of DOP is used, with a defined service time of "one work shift". For P type filters, an indefinite amount of DOP is used until filtration efficiency stabilizes.[N2] P100 filters, under 42 CFR part 84, are the only filters permitted to be magenta in color.[22] HE (high-efficiency) labeled filters (described in the subsection) are only provided for powered air-purifying respirators. HE-marked filters are 99.97% efficient against 0.3 micron particles and are oil-proof.[23][24][25] Since filters are tested against the by definition most penetrating particle size of 0.3 µm, an APR with a P100 classification would be at least 99.97% efficient at removing particles of this size.[N2] Particles with a size both less than and greater than 0.3 µm may be filtered at an efficiency greater than 99.97%.[N2] However, this may not always be the case, as the most penetrating particle size for N95s was measured to be below 0.1 µm, as opposed to the predicted size of between 0.1 and 0.3 µm.[26] A person wearing a powered air-purifying respirator This section is an excerpt from Powered air-purifying respirator § 42 CFR 84.[edit] 42 CFR 84, from 1995 to 2020, copies 30 CFR 11 rules for PAPRs.[N2] The following table lists the air flow requirements for NIOSH-approved PAPRs under Part 84.175. Tight-fitting PAPRs may be fit tested with the facepiece unpowered and in negative-pressure (under 29 CFR 1910.134) while loose-fitting PAPR fit test protocols have not been changed from 30 CFR 11.[CF2] Part 84 air flow requirements Facepiece Air flow inliters/minute Tight-fitting 115 Loose-fitting 170 The following table lists the ratings for particulate ratings for Part 84 PAPRs.[CF2] PAPR100 ratings were added in 2020.[CF3] NIOSH particulate classes for powered air-purifying respirators Particulate Respiratorclass Minimumefficiency level Permitted forTB Permitted forasbestos[CF1] 0.3 micron DOP HEPA or HE 99.97% Yes Yes 0.075 to 1.86 micron NaCl PAPR100-N Ratingdiscontinued Not yetdefined 0.075 to 1.86 micron DOP PAPR100-P PAPR100-N is not designed to filter oil particulates, and the official color-coding for all three respirator types is magenta.[CF2] A study has demonstrated that users carrying out physical work at intensities 80-85% VO2 max "over-breathe" loose-fitting PAPRs and has recommended an increase of air flow to 400 lpm, an approximately two-fold increase over NIOSH-approved values.[27] See also: Chemical cartridge and Gas mask Half-face air-purifying respirator with combination P100 particulate filter (magenta) and organic vapor (black) cartridge Under 42 CFR 84, chemical cartridges and gas mask canisters are defined separately. Use of the TC-14G canister schedule or the TC-23C chemical cartridge schedule for a given respirator depends on whether "acid gas" is a designated contaminant, which is designated for gas mask canisters only, or if the manufacturer is obligated to list all designated contaminants supported by a given chemical cartridge.[ND2] 42 CFR 84 Subsection L describes seven types of chemical cartridge respirators with maximum use concentrations and penetration, noting that colors and markings are definitively based on ANSI K13.1-1973.[CF2] A TB guide, published by NIOSH in 1999, describes 13 combinations of contaminants with unique color markings.[20] The definitive guide from ANSI, who, since the passage of 42 CFR 84 in 1995, has published a 2001 revision of K13.1-1973, named Z88.7-2001, describes 14 combinations of contaminants with unique color markings, based on 13 out of the 28 NIOSH Protection Designations.[S1][ND1] The ANSI standard also notes that these classifications do not apply in aviation or military respirators.[S1] A comparison table below that details the NIOSH protection designations,[ND1] 42 CFR 84,[CF2] the Navy/Marine Field Manual,[28] the NIOSH TB guide,[20] and whether they match up with the (42 CFR 84-declared ANSI K13.1-1973 revision) ANSI Z88.7-2001 colors,[S1] for each type of chemical cartridge is described below. Note that, while the 2001 revision to ANSI K13.1-1973 provides exact colors under the Munsell Color System,[S1] colors and combinations outside the public domain, as well as cartridge/canister designation, have been omitted to facilitate this fair use comparison: Respirator/Filter type designation and color comparison[a] NIOSH protection designations[ND1] NIOSH protection abbreviation[ND1] 42 CFR 84 max use

concentration[CF2][a] Penetration allowed by 42 CFR 84[a] Efficiency level[a] 1999 NIOSH TB Guide color[20] Correlated with Z88.7-2001 (K13.1-1973 revision)?[S1] Acid gas (gas mask only)[ND1] AG N/A White Yes, for canisters only Ammonia AM 300 ppm 50 ppm 83.3% Green Yes Chlorine dioxide CD N/A In standard as combination Chlorine CL 10 ppm 5 ppm 50% White with 1/2" yellow stripe No stripe, but within designation color Chloroacetophenone CN N/A Carbon monoxide CO N/A Blue Yes Chlorobenzylidene malononitrile CS N/A Ethylene oxide EO Formaldehyde FM Hydrogen chloride HC 50 ppm 5 ppm 90% N/A In standard as combination Hydrogen fluoride HF N/A In standard as combination Hydrogen cyanide HN N/A White, with 1/2" green stripe No stripe, wrong color, actual color for unlisted combinations Hydrogen sulfide HS N/A In standard as combination (escape only) Methylamine MA 100 ppm 10 ppm 90% N/A In standard with ammonia Mercury vapor MV N/A Nitrogen dioxide ND Organic Vapor OV 1000 ppm or lower 5 ppm Depends Black Yes Phosphine PH N/A Sulfur dioxide SD 50 ppm 5 ppm 90% N/A In standard as combination Vinyl chloride VC 10 ppm 1 ppm 90% N/A NIOSH designation does not exist, may use unlisted combination color Toluene diisocyanate TDI N/A Demand (SCBA) DE Non-air-purifying respirators (Atmosphere-supplying respirators) Pressure Demand (SCBA) PD Supplied-air (Air-line) SA Supplied-air Abrasive Blast SB Self-Contained (SCBA) SC Escape (SCBA) ESC Purple Part 11 HEPA respirator with MSHA/NIOSH emblems Respirator combination designation and color comparison[a] NIOSH protection abbreviation[ND1] Color Correlated with Z88.7-2001 (K13.1-1973 revision)?[S1] 1999 NIOSH TB Guide combinations[20] Any of above chemicals/ Particulates Gray stripe Wrong color, no stripe HN/Chloropicrin Yellow with 1/2" blue stripe NIOSH designation does not exist, no stripe, wrong color, actual color for unlisted combinations Radionuclides Purple/Magenta Yes, under 30 CFR 11 HEPA AG/HN/CL/OV/AM/CO/ Chloropicrin/ radionuclides/ particulate Red with 1/2" gray stripe No stripe needed, combination more than required for color (AG/OV/AM/CO) AG/AM Green with 1/2" white stripe No stripe, wrong color, actual color for unlisted combinations AG/OV Yellow Yes, for canisters only AG/OV/AM Brown Yes, for canisters only Navy/Marine Field Manual combinations[28][b] "Acid Gases": CL/CD/HS/HC/SD/HF White Combination more than required for color (CL/HC/SD) "Organic Vapors": Xylene/Toluene Brown Within designation color, but wrong color if exclusive "Basic gases": AM/MA Green Yes FM Tan Within designation color, but actual color for unlisted combinations MV Orange NIOSH designation does not exist, wrong color, actual color for unlisted combinations HEPA Purple Yes ^ a b c d e See the NIOSH pocket guide for additional respirator use guidelines. Breakthrough concentration times can be calculated through the NIOSH MultiVapor tool, or OSHA math models. ^ For brevity, only combinations that are different from the TB guide are listed. Person wearing purple 3M 7093 P100 cartridge filters For particulate respirators, while NIOSH designates P100 as filter cartridges that can use the "magenta" color, ANSI designates P100 as "purple", a color which can be seen on some P100 filter cartridges. In addition, the 2001 revision to ANSI K13.1-1973 provides exclusive colors to be used for non-P100 cartridge filters, in two categories: oil-resistant (remaining R- and P- NIOSH ratings), and non-oil resistant (all N-ratings).[S1] By definition, ANSI Z88.2-2015 considers N100, R100, P100, and HE as HEPA filters.[S2] "TC-84A" redirects here. For information on TC-84A N95-class respirators, see N95 respirator.Screenshot of the NIOSH CEL, dated September 30, 2001, with the six respirator schedules NIOSH is the current regulator of all the respirators in this schedule, under 42 CFR 84.[C1] 'BM' stands for the US Bureau of Mines, the historical regulator of respirators in the United States. Approval schedules[28][ND2] US Code Gas mask(Canister[ND2]) Air-line SCBA Particulate PAPR ChemicalCartridge BM BM-14 BM-19 BM-13 BM-21 N/A BM-23 30 CFR 11 TC-14G TC-19C TC-13F TC-21C TC-21C TC-23C 42 CFR 84 (enacted) TC-14G TC-19C TC-13F TC-84A TC-21C TC-23C TC-21C respirator approval numbers for negative-pressure particulate respirators have three digits, in the form: TC-21C-###, while TC-84A respirator approval numbers have four digits, in the form: TC-84A-####.[29] 42 CFR 84 (until 2020) did not change regulation regarding powered-air purifying particulate respirators, so have continued under TC-21C approval, with four digits, in the form TC-21C-####.[N2] These paragraphs are an excerpt from National Institute for Occupational Safety and Health § NIOSH Certified Equipment List.[edit] NPPTL is the designated publisher of the NIOSH Certified Equipment List, or CEL. The CEL is a public domain database that details the respirators currently approved by NIOSH, and is ordered separated based on type of respirator, which is designated with a schedule (e.g. TC-84A).[30] The CEL was initially released in paper form on September 30, 1993. However, due to low usage of the paper CEL, as well as the increasing number of respirators approved by NIOSH, a Microsoft Access-based version of the CEL was released.[31] Initial releases of the CEL had hose and pressure information for air-line respirators. This information had been eliminated due to concerns over users prioritizing the CEL over respirator documentation.[31] Main article: Respirator § Issues NIOSH air filtration ratings do not test the fit of a respirator. Fit testing is required by OSHA for employers when a hazard is present, and voluntary respirator use under Appendix D is not allowed due to the hazard.[32][C5] Rules for fit testing are also defined by ANSI Z88.2. Z88.2 notes that, in Canada, respirator care and fit testing are defined by CSA Z94.4.[S2][S3] Classic collection efficiency curve with filter collection mechanisms A few other jurisdictions use standards similar to the NIOSH scheme to classify mechanical filter respirators. They include: China (GB 2626-2019): Similar testing requirements and grades. Has "KN" and "KP" resistance levels, 90/95/99. Has additional EU-like rules on leakage. Mexico (NOM-116-2009): Same grades. South Korea (KMOEL - 2017-64): EU grades, KF 80/94/99 for second/first/special Aerosol Division of Industrial Hygiene N95 respirator NIOSH European respirator standards ^ Joskow, Paul L. (27 February 2022). "From Scarcity to Abundance: Complementary Government and Private Initiatives to Manage the Allocation of N95 Masks in the U.S. During the COVID-19 Pandemic" (PDF). ^ "Trademark Status & Document Retrieval". 90006709. ^ "Counterfeit Respirators / Misrepresentation of NIOSH-Approval". 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