4 Em Mm

4 mm scale

Double 0 Gauge Association, supports 4 mm modelling using a 16.5 mm gauge EM Gauge Society, supports modelling in both EM (18.2 gauge) and P4 (18.83 gauge)

4 mm scale is the most popular model railway scale used in the United Kingdom. The term refers to the use of 4 millimeters on the model equating to a distance of 1 foot (305 mm) on the prototype (1:76.2). It is also used for military modelling.

For historical reasons, a number of different standards are employed.

EM gauge

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EM was developed because OO gauge, favoured by manufacturers of British prototype models, utilised track that was too narrow. OO was developed in the UK in the 1930s as a response to manufacturers finding they were unable to fit the motors of the time into British prototype small boilered locomotives when scaled at the globally popular HO scale's 3.5 mm to a foot (1:87). As the scale was increased to 4 mm to the foot to make the locomotives larger, the track gauge was left at 16.5 mm (0.65 in), and hence is too narrow (by a scale 178 mm or 7 in) to correctly depict the prototype's track gauge of 4 ft 8+1?2 in (1,435 mm).

EM gauge was founded in the 1950s, originally with 18 mm (0.709 in) gauge track and rolling stock wheelsets based upon the crude and massively out-of-scale products of the contemporary OO model manufacturers.

18 mm gauge was still undersize by almost a millimetre. With the limitations of modelling at this time, particularly the width of tyres, the largest gauge that could fit within the outline of a scale model would be 18.5 mm, no larger. This was mostly an issue for steam locomotives, where the popular technique at the time of making connecting and coupling rods from rail required an excessive spacing between wheel faces and the cylinders.

Attempts to make finer tyre and flange standards were thwarted initially by the overscale rail sections available commercially, it being impractical for an individual modeller to make smaller rails – although some did attempt to, by cutting down commercial rail. Smaller flange and tyre dimensions were also unsuccessful, as the narrow tyres tended to detach from the wheel centres. More critically, small flanges required comparably smaller rail, trackwork gaps and point frogs in order to work reliably.

Wheelset standards did become more fine in time, allowing EM to evolve into 18.2 mm (0.717 in) gauge track (for a while called EEM gauge until it was adopted into the mainstream standard). Some modellers were still not happy with this, it is still a scale 1.9 inches (48.26 mm) too narrow, and developed the P4 standards (18.83 mm or 0.741 in gauge).

Most EM modellers will have started off using OO gauge and having acquired the necessary modelling skills, then advanced into EM. Modellers in EM typically re-wheel their rolling stock and hand-build their trackwork, although pre-built track is available from specialist suppliers. There are also many 4 mm scale kits

which can be used by all 4 mm scale gauges, and since the advanced skills, advanced kitbuilding and scratchbuilding are also common.

EM standards are set by the EM Gauge Society, defining gauge and wheel dimensions to ensure compatibility across layouts.

EM-2 rifle

9 mm) calibre and 1 inch (2.5 cm) long, with a mass of 130 grains (8.4 g). With the release of the SACP reports, interest in the original series of EM weapons

The EM-2, also known as Rifle, No.9, Mk.1 or Janson rifle, is a British assault rifle. It was briefly adopted by British forces in 1951, but the decision was overturned very shortly thereafter by Winston Churchill's incoming government in an effort to secure NATO standardisation of small arms and ammunition. It was an innovative weapon with the compact bullpup layout, built-in carrying handle and an optical sight.

The gun was designed to fire one of the first purpose-designed entirely new intermediate cartridges, designed to a 1945 requirement as a result of combat experience and German advances in weapons design during World War II. The round, the .280 British, was designed to replace the .303 round, which dated to the late 19th century. The EM-2 was intended to replace the Lee-Enfield bolt-action rifles and various submachineguns, while the TADEN would replace the Bren gun and Vickers machine gun.

As part of NATO standardization efforts, the United States claimed the .280 British round was too weak for use in rifles and machine guns, and instead favoured the much more powerful 7.62×51mm NATO round. A bullpup layout for a British service rifle was finally adopted some years later in form of the SA80 assault rifle, which remains in service today.

Nikon EM

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The Nikon EM is a beginner's level, interchangeable lens, 35 mm film, single lens reflex (SLR) camera. It was manufactured by Nippon Kogaku K. K. (today Nikon Corporation) in Japan from 1979 to 1982 (available new from dealer stock until circa 1984). The camera was designed for and marketed to the growing market of new photographers then entering the SLR buyer's market. The EM uses a Seiko MFC-E focal plane shutter with a speed range of 1 to 1/1000 second plus Bulb and flash X-sync of 1/90 second. It is 86 mm (3.4 in) high, 135 mm (5.3 in) wide, 54 mm (2.1 in) deep and weighed 460 grams (16 oz). Unlike most Nikons of the time, it was available only in black. The EM has no full manual exposure mode capability, but instead was intended to be used by inexperienced photographers who could not easily master the intricacies of shutter speeds and f-stops. There were also significant changes to the EM's mechanical and electrical components to reduce its production cost relative to previous Nikon cameras: dimensional tolerances weren't as tight, there were no ball bearings in the film advance mechanism, and no high-quality titanium shutter. The introductory US list price for the body plus normal lens was only $231.

The EM accepts nearly all lenses with the Nikon F bayonet mount except lenses introduced in 1959, non-ai lenses will damage the lensmount, it does support the automatic indexing (AI) feature introduced in 1977. The contemporary Nikon-made AI lenses were the Nikkor AI-S, Nikkor AI and Nikon Series E types. The AF-S Nikkor, AF-I Nikkor, AF Nikkor D and AF Nikkor autofocus lenses are also AI types. Nikon's most recent 35 mm film SLR lenses, the AF Nikkor G type introduced in 2000, lack an aperture control ring, and the AF Nikkor DX type (2003) with image circles sized for Nikon's digital SLRs will mount but will not function properly. IX Nikkor lenses introduced in 1996 for Nikon's Advanced Photo System SLRs must not be mounted to an EM, as their rear elements will intrude far enough into the mirror box to cause damage.

OO gauge

anomaly led some 4 scale modellers in the 1960s to adopt a gauge of 18.2 mm (EM scale), soon followed by some who decided to adopt 18.83 mm and wheel/track

The terms OO gauge and OO scale (or more correctly but less commonly, 00 gauge and 00 scale) relate to the most popular standard gauge model railway standard in the United Kingdom, outside of which it is virtually unknown. "00" is a variant of "H0", meaning Half-0, which historically derives (in increasing size order) from 0 scale, 1 scale and 2 scale, the most popular scales in the early 20th century. Since railway modellers invariably pronounce the zero as "oh" rather than "zero" (e.g. "double-oh" or "aitch-oh"), the scales are often written as OO, HO and O.

00 scale is one of several 4 mm-scale standards (4 mm to the foot or 1:76.2), and the only one to be marketed by major manufacturers of British-outline models.

Logically, to replicate the full-size ("prototype") standard gauge of 1435 mm (4 ft 8+1?2 in) the track gauge at 4 mm-to-the-foot scale would be 18.83 millimetres (0.741 inches). However, the gauge is 16.5 mm (0.65 in), which is the same as in H0 scale – 3.5 mm to the foot or 1:87. This oddity has historical origins: essentially, 00 scale involves 4 mm-to-the-foot bodies being mounted on 3.5 mm-to-the-foot track. The result is that 00 rolling stock appears to be running on narrow gauge. The anomaly led some 4 scale modellers in the 1960s to adopt a gauge of 18.2 mm (EM scale), soon followed by some who decided to adopt 18.83 mm and wheel/track proportions very close to full-scale practice (Protofour standards).

EM-4 rifle

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2-8-8-4

production of 40 new class T-3 4-8-2 type locomotives built at the railroad's own Mt. Clare shops, the B&O ordered 30 class EM-1 Yellowstones from Baldwin

A 2-8-8-4 steam locomotive, under the Whyte notation, has two leading wheels, two sets of eight driving wheels, and a four-wheel trailing truck. The type was generally named the Yellowstone, a name given it by the first owner, the Northern Pacific Railway, whose lines ran near Yellowstone National Park. Seventy-two Yellowstone-type locomotives were built for four U.S. railroads.

Other equivalent classifications are:

UIC classification: 1DD2 (also known as German classification and Italian classification)

French classification: 140+042

Turkish classification: 45+46

Swiss classification: 4/5+4/6

Russian classification: 1-4-0+0-4-2

The equivalent UIC classification is, refined for simple articulated locomotives, (1?D)D2?.

A locomotive of this length must be an articulated locomotive. All Yellowstones had fairly small drivers of 63 to 64 inches (1.60 to 1.63 m). (For greater speeds, the Union Pacific Railroad chose a four-wheel leading truck and drivers of 68 inches (1.73 m) for its Big Boy 4-8-8-4 class.)

Several classes of Yellowstone, especially the Duluth, Missabe and Iron Range's locomotives, are among the largest steam locomotives, with the exact ranking depending on the criteria used.

Orders of magnitude (length)

in Europe 4.000 Mm – length of the Kalahari Desert 4.350 Mm – length of the Yellow River 4.600 Mm – width of the Mediterranean Sea 4.800 Mm – length of

The following are examples of orders of magnitude for different lengths.

.280 British

necked-down 7 mm variant For 7 mm HV, 7 mm Compromise, 7 mm Second Optimum: 7mm-08 Remington EM-2 rifle BSA 28P rifle Taden gun 7 mm caliber

other 7 mm cartridges - The .280 British was an experimental rimless bottlenecked intermediate rifle cartridge. It was later designated 7 mm MK1Z, and has also been known as .280/30, .280 Enfield, 7 mm FN Short and 7×43mm.

Like most armed forces in the immediate post-World War II era, the British Army began experimenting with lighter rounds after meeting the German StG 44 in combat. The Army began development in the late 1940s, with subsequent help from Fabrique Nationale in Belgium and the Canadian Army. The .280 British was tested in a variety of rifles and machine guns including the EM-2, Lee–Enfield, FN FAL, Bren, M1 Garand and Taden gun.

Despite its success as an intermediate cartridge, the .280 British was not considered powerful enough by the US Army and several variants of the .280 British were created in an attempt to appease the US Army. However, the US Army continued to reject these variants, ultimately adopting the cartridge that was then designated the 7.62×51mm NATO.

Protofour

standards for model railways allowing construction of models to a scale of 4 mm to 300 mm (1 ft) (1:76.2), the predominant scale of model railways of the British

Protofour or P4 is a set of standards for model railways allowing construction of models to a scale of 4 mm to 300 mm (1 ft) (1:76.2), the predominant scale of model railways of the British prototype. For historical reasons almost all manufacturers of British prototype models use OO gauge (1:76.2 models running on 16.5 mm (0.65 in) gauge track). There are several finescale standards which have been developed to enable more accurate models than OO, and P4 is the most accurate in common use.

The P4 standards specify a scale model track gauge of 18.83 mm (0.741 in) for standard gauge railways. Joe Brook Smith was the first to propose use of an exact scale track gauge in July 1964, when also the term Protofour was invented by Malcolm Cross. The standards were later published in Model Railway News by the Model Railway Study Group in August 1966.

Just as in the prototype railway, on a model the wheel-rail interface is the fundamental aspect of reliable operation. So as well as a track gauge, P4 also specifies the wheel profile and track parameters to use, which are largely a scaled-down version of real-life standards with some allowances for practical manufacturing tolerances.

P4 standards have been extended to several other prototypes. Broader than standard gauges have been modelled using P4 standards, including Brunel's 7 ft 1?4 in (2,140 mm) gauge, modelled with 28.08 mm (1.106 in) track and Irish P4, the 5 ft 3 in (1,600 mm) Irish broad gauge modelled in P4 in 4 mm scale with 21 mm (0.827 in) gauge track. Several successful models of narrow gauge prototypes with a correspondingly accurate track gauges have also been produced to P4 standards.

P4 standards are promoted worldwide by the Scalefour Society, which is based in the United Kingdom. The EM Gauge Society also provides support for modelling to P4 standards: many P4 modellers belong to both societies. The standards document is hosted by the Scalefour Society and the society's Central London Area Group (CLAG) make a HTML version available.