= NSB El 17 =

The NSB El 17 is a class of twelve electric locomotives built by Thyssen @-@ Henschel and Norsk Elektrisk & Brown Boveri (NEBB) for the Norwegian State Railways (NSB) . The class was built in two batches , the first delivered in 1982 and numbered 2221 ? 2226 , and the second delivered in 1987 and numbered 2227 ? 2232 . The traction system of the El 17 was based on the DB Class 120 of Germany (BBC , AEG and Siemens) and were among the first in the world to feature three @-@ phase asynchronous motors . The units were ordered to be used on the intercity Bergen , Dovre and Sørland Lines , but were plagued with technical faults (overheating traction equipment , transient voltages , etc .) . The unreliability and lack of sufficient power forced NSB to instead use them in the regional Vestfold and Gjøvik Lines . With the delivery of the El 18 , the first series was retired or used as shunters . The second series has been used on the Flåm Line since 1998 .

The locomotives have a maximum 3 @,@ 000 kilowatts (4 @,@ 000 hp) power output and a 240 kN (54 @,@ 000 lbf) tractive effort , allowing the locomotive to haul a six @-@ car train . They run on a 15 kV 16 2 ? 3 Hz AC power supply and are capable of operating at 150 km / h (93 mph) . The units have a Bo 'Bo ' wheel arrangement , have regenerative brakes and weigh 64 tonnes (63 long tons ; 71 short tons) . The series was delivered at the same time as the Di 4 and have some similarities with the class .

= = History = =

During the late 1970s , NSB was in need of new rolling stock for their intercity trains . At first electric multiple units were considered , but NSB instead chose to order locomotives and waggons , to have greater operational flexibility . The choice fell on the German DB Class 120 , which was the first three @-@ phase asynchronous locomotive in the world in " almost " regular service (prototype 120 @.@ 0 in test service 1979 , the serial version 120 @.@ 1 from 1986) . However , the Norwegian variation was scaled down due to the maximum axle load (16 @.@ 0 t or 15 @.@ 7 long tons or 17 @.@ 6 short tons , Class 120 has 21 @.@ 0 t or 20 @.@ 7 long tons or 23 @.@ 1 short tons) and had a lower power output than the Class 120 . Because of this , the El 17 is less powerful than its three predecessors , El 14 , El 15 and El 16 (3 @.@ 0 MW instead of 4 @.@ 4 MW) .

When the order was placed , it was the first Norwegian electric locomotive with the mechanical components built in Germany . At the same time , NSB ordered five six @-@ axle diesel @-@ electric locomotives from Thyssen @-@ Henschel (Mark Di 4) , almost the same as the Danish Mark ME 1500 . The Di 4 / ME 1500 have many similarities to its electric counterpart El 17 . The two were planned to have the same rectifiers and motors , but due to weight restrictions the El 17 received the same type as Class 120 .

The first six locomotives , numbered 2221 ? 2226 , were delivered in 1982 . At the same time , the delivery of the B7 passenger cars from Strømmens Verksted was made , and the first train with an El 17 and B7s in regular service operated on the Dovre Line on 14 September 1982 . The El 17 was plagued with problems (overheated components , etc .) , and NSB quickly decided to operate them in pairs in case one unit should fail . On 6 July 1982 , there was a fire in 2224 , and it was sent to Thyssen @-@ Henschel to be redesigned . NSB initially placed the unit in service with a round trip from Oslo to Trondheim each day . Due to the technical malfunctions , all the six original trains were rebuilt several times ; in the end , they all had different technical solutions .

Eventually NSB felt confident that they had found a technical solution that would be satisfactory , and ordered another six units to allow all trains on the Dovre , Bergen and Sørland Lines to be hauled with the class . Units 2227 ? 2232 were delivered in 1987 , and put into regular service on the Sørland Line . Although better than the first series , the second series was also prone to technical problems , and never entered regular service on the Bergen Line . During the 1990s , they were also put into service on the regional rail services on the Vestfold and Gjøvik Lines . The units were never well @-@ liked by NSB , in part because of the bad name the first series had given , and partly because the number of available units was unpredictable . It also took a while for NSB to discover that asynchronous locomotives needed to be operated differently . The locomotives had

been designed to haul a six @-@ car train , but NSB regularly needed to haul eight @-@ car trains , and therefore instead used the more powerful El 16 .

In the early 1990s , NSB decided that they would replace the intercity trains with the Class 73 tilting multiple unit , and the locomotives for loco @-@ hauled trains with the Swiss @-@ designed El 18 (also with electric equipment from ABB , former BBC) . In 1997 , no . 2226 was put aside , and scrapped the following year . From 1998 , the second series of El 17 was put into service on the Flåm Line , a steep tourist line that connects to the Bergen Line . The units were painted green and connected at each end of a train of six B3 passenger cars . From 2003 , the first series was taken out of regular service , and units 2222 , 2224 and 2225 were put into shunting service at Lodalen . Unit 2223 was transferred to the Norwegian Railway Museum , where it was put on display .

= = Specifications = =

The El 17 was built by the manufacturer Thyssen @-@ Henschel of Germany . The locomotives have three @-@ phase asynchronous motors with a continuous output power of 3 @,@ 000 kilowatts (4 @,@ 000 hp) , allowing a maximum speed of 150 kilometres per hour (93 mph) . The units receive 15 kV 16 2 ? 3 Hz AC power from a pantograph and are the first class of locomotive for NSB that has regenerative brakes . The electrical equipment was designed by the manufacturer BBC (German plant Mannheim) but built by the Norwegian manufacturer Norsk Elektrisk & Brown Boveri (NEBB) . Each locomotive is equipped with four NEBB BQg 3855 motors , giving a Bo 'Bo ' wheel arrangement and a maximum tractive effort of 240 kilonewtons (54 @,@ 000 lbf) on dry rails .

The El 17 is an electric locomotive designed for intercity trains , but is also capable of hauling light freight trains . The body is welded as a self @-@ containing construction . The roof (light alloy) sections can be removed , and the locomotives were the first Norwegian locomotives to have a center aisle in the machine room . The locomotives are 16 @.@ 30 metres (53 ft 6 in) long , have a wheel diameter of 1 @,@ 100 millimetres (3 ft 7 in) and weigh 64 @.@ 0 tonnes (63 @.@ 0 long tons ; 70 @.@ 5 short tons) . The locomotives can run in multiple ; by using a UIC 568 signalling cable , the locomotives do not need to be adjacent to each other in the train. the El 17 has the unique pointed front that was first used on the El 16 , and is also found on the Di 4 and Di 6 classes .