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Seamless Steel Pipes for High Pressure Gas Cylinder†

1. Introduction

Concern about the global environment is driving a shift from gasoline to natural gas for automobile fuel, to reduce emissions of NOx, CO_2, graphite, and other toxic substances, as well as to reduce the noise of driving cars. The target of the usage of natural gas cars is 22 000 as of 2004, and 1 million by 2010.

Figure 1 shows an example of the fuel-supply system in a natural gas car. The compressed natural gas (CNG) cylinder must have sufficient strength to withstand the pressure of natural gas and be light-weight for reducing the fuel consumption of the car. Accordingly, the cylinder should be made of a seamless steel pipe having high strength (approximately 990 MPa) and thin pipe wall. To meet these requirements, the seamless steel pipe section of JFE Steel has developed a technology to manufacture extra-thin wall thickness steel pipes.

This report describes the outline and features of the steel pipe.

2. Features of the Steel Pipe for High Pressure Gas Cylinder, Manufactured by JFE Steel

The steel pipe for high pressure gas cylinders has the following features.

(1) **Figure 2** shows the available sizes of seamless steel pipes of JFE Steel. Extra-thin wall thickness steel pipes are available, with a 4.3 mm wall thickness for 177.8 mm outer diameter, and 7.0 mm for 406.4 mm, which should increase the mileage by reducing the weight of the car.

(2) Although the wall thickness tolerance is strictly specified by JIS standard considering the pressure resistance with stress concentration, the manufactured tubes satisfy the tolerance specified by the standard ranging from +30% to −0%, even in the extra-thin wall thickness region, (e.g., for 4.3 mm wall thickness, the upper limit of 5.49 mm and lower limit of 4.30 mm).

(3) Regarding the mechanical properties, the strength can be controlled by adding Cr and Mo, and by applying quenching and tempering.

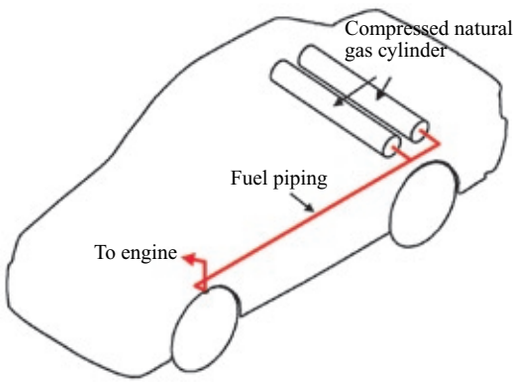
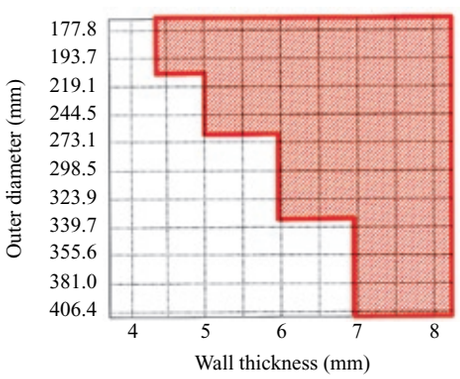


Fig. 1 Example of fuel supply system of natural gas in car



Tolerance of outside diameter (%)	Tolerance of wall thickness (%)	Tolerance eccentricity (%)	Tolerance of length (mm)
±1	+30 − 0	≦20	+30 − 0

Fig. 2 Size availability with medium-diameter seamless steel pipe

3. Conclusion

JFE Steel has established a system for manufacturing extra-thin wall thickness seamless steel pipes for natural gas cars. Usage of these tubes is expected to increase as natural gas cars become more popular, and we are confident that our products fully satisfy the requirements for such applications.

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