

Nissan Engineering Standard

N E S	Specifications for Lock Washers	D 2320 Revised 1998
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1. SCOPE

This Standard specifies the specifications for lock washers (hereinafter referred to as washer) set forth in NES D 2321, D 2322 and D 2118 Appendix 2.

Remark: Materials and surface treatment specified in this standard shall satisfy NES M 0301 (Substance Use Restrictions).

2. TYPE

The washer shall be classified into the following 5 types as shown in Table 1.

Table 1 Washer type

Washer type		Application
Lock washer	No. 2	For general use (equivalent to JIS No. 2)
	No. 3	For heavy load (equivalent to JIS No. 3)
Wave lock washer		For heavy load
Conical lock washer	No. 1	General bolts, screws and nuts
	No. 2	Hexagonal socket bolt

3. MATERIAL

The standard materials to be used for the lock washer and the wave lock washer shall be SWRH57 (A, B) to SWRH77 (A, B) specified in NES M 1111 and the materials for the conical lock washer shall be S50CM to S60CM in NES M 1121.

4. QUALITY

4.1 Surface condition

The surface of the washer shall be smooth, without any defects such as fracture, crack, harmful flaw and rust, etc. and there shall be no sharp corner on inner and outer peripheries. Further, the cut end of the washer shall not have any remarkable burrs and cut end clearance and angle shall not overlap when compressed completely so that more than two washers will not be linked in the form of a chain.

On the other hand, the position of the cut end of the wave lock washer shall be nearly at the center of up-grade of the wave.

4.2 Hardness

After forming, proper heat treatment shall be applied to the washer and its hardness shall be as shown in Table 2; further there shall be no remarkable decarburization of the washer:

Table 2 Hardness of washer

Washer	Hardness	
Lock washer	42 to 50 HRC	412 to 513 HV
Wave lock washer	40 to 48 HRC	392 to 484 HV
Conical lock washer		

4.3 Shape and dimensions

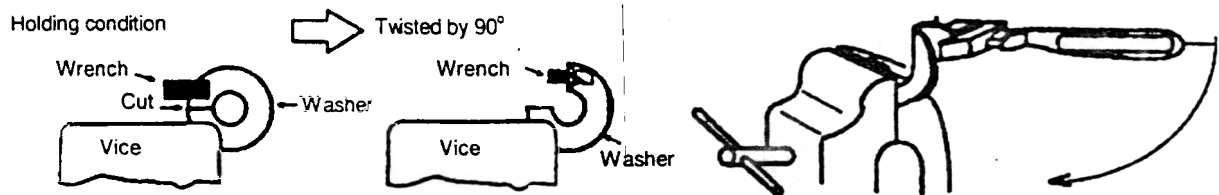
The shape and the dimensions of the washer shall conform to NES D 2321, D 2322 and D 2118 Appendix 2.

4.4 Spring action

When the washer is subjected to the compression test given in 6.2, its free height after the test shall satisfy the requirements specified in NES D 2321, D 2322 and D 2118 Appendix 2 (Remark 3).

6.4.2 For the torsion test specified in NES D 2118 Appendix 2, cut a section of the washer and hold it with a vice and the mouth piece of a wrench as shown in Fig. 2 and twist in the horizontal direction. When holding the washer, do not hold more than 1/4 of the washer circumference.

Fig. 2 Torsion test (example)



7. INSPECTION

The inspection of the washer shall meet the requirements set forth in 4, 5, and the part standards of NES D 2321, D 2322 and D 2118 Appendix 2.

8. DESIGNATION

The washer shall be designated by its part number.

Further, the description, type, nominal size and surface treatment may be indicated additionally in this order.

Example: 89-15140-10 WASH-LOCK SPR

Applicable Standards:	NES M 0140-1995	Salt Spray Testing Method
	NES M 0301-1997	Substance Use Restrictions
	NES M 1111-1988	High Carbon Steel Wire Rods
	NES M 1121-1978	Carbon Steel Strip for Springs
	NES M 4040-1994	Specifications – Zinc Plating and Chromate Films on Iron and Steel
	NES M 4052-1997	Zinc Chromate Organic Coating
	NES D 2118-1994	Bolt 4T – Hexagon Head, with Conical Spring Washer
	NES D 2321-1997	Washers – Lock, Spring
	NES D 2322-1997	Washers – Lock, Wave
	JIS Z 2244	Method of Vickers hardness
	JIS Z 2245	Method and Rockwell and Rockwell superficial hardness test