



QM-C-7.1/MISC/0007

Inspection Plan(Check Sheet)

Item: Vertical & Lateral Hydraulic Dampers
Specn. : MP.0.49.00.16 Rev-01 Jun'10
Amd.:
Drg. No. & Alt.: WDG3A- SK VL-295,SK VL-328 WDM3A- SK.VL-471
WDM3D- SK VL-295,SK VL-328 & SKVL-387

**ENDURANCE TESTING PROCEDURE FOR HYDRAULIC DAMPERS OF WDG3A
WDM3D (WITH EQUALISER & COMPENSATING MECHANISM) AND
WDM3A / WDM3C (WITH A.T.H.S. BOGIE) LOCOMOTIVES**

The ascertaining the damping characteristics and strength test, the hydraulic damper samples to be tested shall be subjected to endurance testing as follows :-

1. **PROCEDURE :**

Two of the samples that have passed the tests under Para 4.1 to 4.4 shall be randomly selected for endurance testing.

The hydraulic dampers shall preferably be tested in their normal plane of operation.

The hydraulic damper shall be connected to the testing machine with its flexible end mountings in the same manner as it is done on the locomotives. No additional flexible elements shall be used for this purpose. However, in the case of hydraulic dampers where such installation is not possible flexible elements suitable for installing the hydraulic damper on testing machine (having characteristics identical to that of flexible element provided on the hydraulic damper). Shall be allowed to be used provided prior approval RDSO has been obtained for this purpose.

The endurance testing machine shall enable keeping one end of the hydraulic damper fixed and the other end oscillating at 1.67 Hz with amplitude of 19.5 from mean position corresponding to a maximum velocity of 10 cm/sec.

Hydraulic damper shall thus be subjected to a total 3 million cycles. The damper oil temperature should not exceed 70⁰C temperature during the endurance test.

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After completion of 8 Lakh, 16 Lakh 24 Lakh and 30 Lakh cycles each the hydraulic damper shall be removed from endurance testing machine and re-tested for overall damping characteristics as mentioned above after it cools to room temperature so that the damping characteristics test is carried out with the hydraulic damper at a temperature between 27° C to 33° C inclusive. The necessary data should be recorded as per the Proforma enclosed at Annexure 1C. A continuous record of endurance testing shall be maintained in the log sheet as per the Proforma placed at Annexure I.D.

The cycle working on endurance testing machine shall preferably be continuous except for short intervals when hydraulic damper is removed for checking their capacity or when circumstances are beyond the control of testing agency e.g. power etc.

CRITERIA FOR ACCEPTANCE:

After completion of recommended endurance cycles as above, the sample hydraulic dampers shall be considered to have passed this endurance test it.

- a. No damage or distortion to damper components or oil leakage occurs.
- b. The damping characteristic do not deteriorate beyond 120% of rated damping capacity upto 16 lakh cycles and +25% beyond that .

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DUMPER PERFORMANCE TEST

Dumper No.	Dumper Details		Condition (Before/ After) Strength Test	At Variable Frequency & Stroke						At Constant Stroke of ± 9.5 mm						At constant Frequency of 1.67 Hz			
	Capacity Kg. at 10 cm/sec	Type Vertical/ Lateral		At Piston Velocities of						At Piston Velocities of									
				1.67 Hz ± 9.5 mm		0.83 Hz = 19mm		0.53 Hz ± 28.5 mm		20 (mm/sec)		60 (mm/sec)		100 (mm/sec)		60 (mm/sec)		100 (mm/sec)	
	Comp	Expn		Comp	Expn	Comp	Expn	Comp	Expn	Comp	Expn	Comp	Expn	Comp	Expn	Comp	Expn	Comp	Expn
1																			
2			Before																
3			After																
4			Before																
5			After																
6			Before																
7			After																
8			Before																
9			After																
			Before																
			After																

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A TYPICAL FORCE DISPLACEMENT CHARACTERSTIC LOOP OF A HYDRAULICS DAMPER

SCANED PICTURE



DAMPER PERFORMANCE DURING AFTER ENDURANCE TEST

Product Vertical Hydraulic Damper	Capacity (kg.)
Application Primary / Secondary	RDSO Drawing No.
Sample No.	
Test Dates:	Start:
	Completion:

S. No.	Endurance Test State	At Constant Stroke of ± 9.5 mm						At Constant Frequency of 1.67 Hz					
		At Piston Velocities of								At Piston Velocities of			
		20 (mm/sec.)		60 (mm/sec.)		100 (mm/sec.)		60 (mm/sec.)		100 (mm/sec.)			
		Comp	Expn	Comp	Expn	Comp	Expn	Comp	Expn	Comp	Expn		
1	Initial												
2	After 8 Lakh Cycles												
3	After 16 Lakh Cycles												
4	After 24 Lakh Cycles												
5	After 30 Lakh Cycles												

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LOG SHEET FOR ENDURANCE TESTING DATA OF HYDRAULIC DAMPERS

Product Vertical Hydraulic Damper		Capacity (kg.)
Application Primary / Secondary		RDSO Drawing No.
Sample No.		
Test Dates :		Start :
		Completion :
Stroke (mm)	Frequency (Hz)	Velocity (cm/sec.)

Sl. No.	Date	Started Time	Stopped Time	Total hrs.	No. of Cycles	Cumulative No. of cycles complete	Temperature of damper (RC)	Remarks

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Annexure II

QUALITY ASSURANCE & GUARANTEE CERTIFICATE
(Reference – Clause 8 of Specification No. MP 0.49.00.16)

No..... Date.....

Railway

P.O. No..... Dated.....

Quantity Consignee.....

Hydraulic Dumper Description

1. THIS IS TO CERTIFY THAT THE HYDRAULIC DAMPERS INDICATED IN THIS PURCHASE ORDER HAVE BEEN SUBJECTED TO OUR INSPECTION AND TEST PROCEDURES AND ARE FOUND TO CONFIRM TO THE ORDER / DRAWING / SPECIFICATION REQUIREMENTS.
2. THE QUALITY CONTROL PROCEDURES IN RESPECT OF THIS SUPPLY ARE IN ACCORDANCE WITH OUR QUALITY MANUAL AND AS PER APPROVED QUALITY ASSURANCE PLAN.
3. THIS IS TO CLEARLY THAT LAOHYDRAULIC DAMPER SUPPLIED AGAINST THIS PURCHASE ORDER SHALL FUNCTION SATISFACTORILY FOR THE INTENDED APPLICATION & PERIOD SPECIFIED IN THE RELEVANT SPECIFICATION.

Dated :

Q.C. INCHARGE
(SIGNATURE & SEAL OF THE MANUFATURER)



INSPECTION PLAN FOR HYDRAULIC DAMPERS
AS PER SPECIFICATION NO. MP 0.49.00.16 (Rev. 01) JUNE 2010

A. SCOPE :

This inspection plan covers the checks to be carried out by the Authorized inspecting Agency during inspection of vertical & lateral hydraulic dampers as per RDSO Drg. No. SKVL – 295 SK VL-328, SK VL-471 & SK VL-527.

B. CONTRACT DOCUMENTS :

S.No.	Description
1.	Purchase Order in Reference
2.	Drawing(s) referred in purchase order
3.	RDSO's specification No. MP 0.49.00.16
4.	RDSO's approved Quality Assurance Plan of the firm for Hydraulic Dampers

C. GENERAL CHECKS BY THE INSPECTOR :

Before commencing the inspection, the inspector shall ensure that :

- i) The delivery period of the Purchase Order is valid.
- ii) Check the internal inspection record carried out at various stages of manufacture of the product by the firm's quality control department for the product being offered and confirm that the result of the internal inspection records are in order.
- iii) The measuring instruments, gauges testing facilities etc. are in working order and they are properly calibrated.

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D. INSPECTION PROCEDURE

i. Sample Size

Sample for various tests shall be drawn from each lot of 100 nos. offered for inspection by the representative of Authorized inspecting Agency. The following tests shall be carried out.

S.NO.	TEST	SAMPLE SIZE
1.	Visual Inspection	10 NOS
2.	Dimensional Check	10 NOS
	Physical Test	
	i) Strength Test	
3	ii) Force – displacement / over all damping characteristic test.	05 NOS
	iii) Sphere blocs test (for stem type damper)	
4	Endurance test (At the time of prototype approval and every alternate year as per Spec. No. MP 0.49.00.16 of Annexure-1)	02 NOS

If the quantity offered for inspection is less than 100 Nos., the sample sizes will be as per a lot of 100 nos. as mentioned above.

ii. Visual Dimensional Check & Physical Tests :

(a) Visual Checks

Samples picked up at random per lot of Hydraulic Dampers offered for inspection shall be subjected to the following visual checks.

- Hydraulic Dampers shall be checked visually for general workmanship free from welding defects and surface finish and should be found satisfactory.
- The dampers were provided with identification marking indicating Firm's Name, type of damper, rated capacity of damper, drawing No. serial no. and month & years of manufacture as per the specification.
- The results of visual check shall be recorded in the check sheet provided with this Inspection Plan.

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(b) Dimensional Checks

Samples picked up at random per lot of Hydraulic Dampers offered for inspection shall be subjected to the dimensional checks. The Hydraulic Dampers shall confirm to the dimensions and tolerance as given in relevant drawings.

(c) Physical Tests :

1. Strength Test :

The construction of Hydraulic Damper shall be checked to withstand the static compressive axial load of 3 tones when fully closed and a tensile load of 3 tonnes when fully extended. No component of dampers should suffer damage, permanent distortion oil leakage or change in damping characteristic.

2. Force – Displacement / Overall Damping Characteristics :

The overall damping forces on the compression and extension strokes of the damper shall be within the + 10% tolerances of capacity as specified in the drawing(s).

The Hydraulic Damper shall be assembled in such a manner that the damping shall be uniform throughout the stroke i.e. the damping characteristics shall not have any sudden deviation or changes throughout the stroke.

3. Sphere blocks test :

This test shall be conducted on stem type dampers.

The twisting angles shall be checked on five dampers. One end of damper fixed and on the other end of damper, force is applied to check twisting angle. The damper should be able to rotate more or at least equal to the values specified in the drawing in twisting mode.

The cardanic angles shall be checked on five dampers. For tis test, sphere blocs (Silent block) of the damper fixed in a fixture and then force is applied to check cardanic angle. The damper should be able to rotate more or at least equal to the values specified in the drawings in cardanic mode.

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E. ACCEPTANCE CRITERIA :

- i) The firm shall not withdraw the material offered for inspection during the course of inspection. Any move by the firm in any way to withdraw the material / interfere / hinder with the inspection shall render rejection of the entire quantity of material offered for inspection.
- ii) If any sample fails in one or more criteria given in Para D of this Inspection Plan, double the sample size shall be drawn and tested against the criteria in which the failure had occurred. If all the samples of double sampling pass the criteria, another 10 No. sample will be tested and if the same also pass, the entire quantity shall be accepted except the failed ones. Otherwise the entire quantity shall be rejected.
- iv) Failure of any sample of the double samples will however, result in rejection of the entire offered quantity. The intimation of failure and rejection shall also be sent to RDSO.
- v) In the event of rejection, the entire quantity offered for inspection shall be made unsuitable for Railway application in presence of the inspecting agency.

F. STAMPING :

The Hydraulic Dampers which has been inspected and passed shall be double stamped by the Inspecting Agency. The entire quantity of Hydraulic Dampers from which the sampling has been taken shall be stamped (single stamp mark) by the inspecting Agency. Double stamping mark is to identify the samples, which were drawn for inspection for future reference in the event of any dispute.

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PROFORMA 1

GENERAL CHECK SHEET

S.No.	Description	Observation
1.	Name of Component	
2.	Firm's Name	
3.	Date (Period) of Inspection	
4.	Contract Details as per P.O.	
	A) Purchase Order No. & Date	
	B) Order placing Authority	
	C) Specification No.	
	D) Drawing No.	
5.	Quantity on Purchase Order.	
6.	Quantity offered for Inspection	
7.	Consignee	
8.	Validity of D.P. of P.O.	
9.	Remarks on internal Checks carried out by the firm.	
10.	Remarks on calibration of Measuring Instruments & Testing Facilities.	

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PROFORMA 2

VISUAL CHECK SHEET

A. Drawing No. :

B. Lot No. :

C. Visual Check :

Sample No.	1	2	3	4	5	6	7	8	9	10	Remarks
Visual Check											
Identification Marking.											

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PROFORMA 3

STRENGTH TEST & DAMPING CHARACTERISTICS TEST CHECK SHEET

Dumper No.	Dumper Details		Condition (Before/ After) Strength Test	DAMPING FORCE (KG.)													
	Capacity Kg. at 10	Type Vertical/ Lateral		At Variable Frequency & Stroke						At Constant Stroke of ± 9.5 mm						At constant Frequency of 1.67 Hz	
				1.67 Hz ± 9.5 mm		0.83 Hz = 19mm		0.53 Hz ± 28.5 mm		At Piston Velocities of 20 (mm/sec)		60 (mm/sec)		100 (mm/sec)		At Piston Velocities of 60 (mm/sec)	
	Comp	Expn		Comp	Expn	Comp	Expn	Comp	Expn	Comp	Expn	Comp	Expn	Comp	Expn	Comp	Expn
	1																
2			Before														
3			After														
4			Before														
5			After														
6			Before														



DIMENSIONAL CHECK SHEET
(For Eye Type Dampers)

S. No.	Drawing No. & Capacity								
	Specified Value As per Drawing.	320 ± 3	440 ± 3	40	44	30	23 ^{+0.021/0.00}	34 ^{+0.00/-0.05}	Remarks
	Firms SI.No.	L	L1	L2	L3	L4	L5	L6	
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									

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DIMENSIONAL & SPHERE BLOCKS TEST CHECK SHEET
(For Stem Type Dampers)

S. No.	Drawing No. & Capacity																Remarks
	Specified Value As per Drawing.																
	Firm's Sl.No.	l-max	l-min	D ₁	D ₂	l ₁	l ₂	l ₃	l ₄	l ₅	l ₆	D	R	S	Twisting Angle	Cardanic Angle	
1.																	
2.																	
3.																	
4.																	
5.																	
6.																	
7.																	
8.																	
9.																	
10.																	

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