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Document Title: Specification of Weld Trimmer Power Pack Version for A.T. Welding			



Specification of Weld Trimmer Power Pack Version For A.T. Welding

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Second Revision, 2022**

Track Machines & Monitoring Directorate

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1.0 SCOPE:

- 1.1** This specification covers the performance and other requirements of a small portable machine used for trimming (shearing off) the extra weld metal from the head (top and sides) of an AluminoThermit Welded rail joint immediately after the welding operation. Use of this machine replaces the age old crude method of removing extra metal by manual chiselling. In this specification “Weld trimmer Power Pack version for A.T. Welding” will be termed as ‘Trimmer’ for conveniences.
- 1.2** The equipment is characterised by two shear blades travelling towards each other by a hydraulic force provided by two double acting cylinders and four way direction control valve connected with a hydraulic pump through hoses.
- 1.3** Hydraulic pump may be hand operated pump or motor driven with diesel/petrol engine commonly known as power pack.
- 1.4** Clause no. 1.6 & 7.0 (Prototype Test) is not applicable for Hand operated Weld Trimmer. However, Clause no. 1.6 & 7.0 is only applicable for Weld Trimmer Power Pack Version for A.T. Welding.
- 1.5** Preference to make in India: compliance of the instruction contained in public procurement (preference to make in India) order -2017 “Make in India” and latest guidelines issued in this regard shall be ensured.
- 1.6** All the provisions contained in RDSO’s ISO procedures laid down in Document No. QO-D-8.1-11 dated 12.09.2018 (titled Vendor – Changes in approved status’), subsequent versions / amendments thereof shall be binding, and applicable on the successful manufacturers/suppliers in the contracts floated by Railways to maintain quality of products supplied to Railways.
- 1.7** Supplier is fully responsible to maintain the quality of product supply to Indian Railways. (This clause is applicable for Hand operated Weld Trimmer)

2.0 REFERENCE DOCUMENT:

Following IS codes have been referred to in this specification. Updated copies of the same shall be available in the works of the manufacturer/Suppliers.

- i) **IS: 1337-1993** (Re-affirmed-2006): Electroplated Coatings of hard Chromium for Engineering Purposes.
- ii) **IS: 1986-1981**(Re-affirmed-2006): Code of Practice for Hard Chromium Plating for General Engineering Purposes.
- iii) **IS: 6838-1973** (Re-affirmed-2005): Dimensions for O-Rings and Grooves for Vacuum Flanges.
- iv) **IS:7651-1997**(Re-affirmed-2003): Wire Reinforced Rubber Covered Hydraulic Hose-Specification.
- v) **IS: 10585-2002**: Method of test for Cylinders for Oil Hydraulic Systems.
- vi) **IS: 11337- 2002**: Purchase Specification for Hydraulic Cylinders.
- vii) **ASTMD 2000**: Specification of Oil Seals.

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3.0 MATERIAL AND CONSTRUCTION:

- 3.1 The machine shall be of robust construction.
- 3.2 Strength and other essential physical properties of component parts shall be adequate for the purpose intended and shall be suitable for giving required shearing force. All components shall be designed after taking adequate factor of safety as per standard practices, and relevant codal provisions.
- 3.3 The assembly and details of various components/parts/subassemblies shall be as per drawings of the manufacturer approved by purchaser/RDSO/Railway Board.
- 3.4 The design, construction and fabrication of hydraulic cylinders and its ram/piston shall conform to relevant Indian Standards (IS 11003-84, 11146-84, 11559-85, 12593-89, 11337-85, 10411-83, 8208-76, 8203-76, 8203-76, 11560-1985, 12092-1987 etc.) or BS/ISO specifications.
- 3.5 Working surfaces of the cylinder piston rod shall be hard chrome plated having an average thickness of 50 micron conforming to IS : 1337-1980 (electro-plated coating of hard chromium on iron and steel for engineering purpose) after following code of practice IS: 1986-1981 (code of practice for hard chromium plating on iron and steel for general engineering purpose).
- 3.6 Oil seals (nutring, O-ring, washer etc.) shall be of special high pressure brand of synthetic neoprene/nitrile rubber (superior brand to be provided, generally conforming to IS:6838-79).The physical characteristic of the oil seals when tested in accordance with ASTM D-2000 shall be as mentioned in **Annexure-I** attached herewith.
- 3.7 Oil pipes/rubber hoses shall be of double steel wire braided impregnated by rubber to with stand working pressure of 600 kg/cm²generally conforms to IS: 7651-79 preferably similar to brand R-2-100.

4.0 FUNCTIONAL REQUIREMENTS:

- 4.1 The machine shall be capable of removing excess weld metal of alumina thermit weld joint (commonly known as A.T.Weld) uniformly from top and sides of rail head without giving any jerk/shock to the weld while worked either by hand pump or motor driven hydraulic pump fitted with diesel/petrol engine.
- 4.2 The machine shall be robust and rugged in construction and design to withstand the various operating and handling forces.
- 4.3 The construction of the machine shall be such that parts can be easily and quickly replaced in case of break down while carrying out work at site.
- 4.4 The design and construction of machine shall be such that the operator is able to watch the trimming process continuously.
- 4.5 It shall be easy to use, operate and maintain.
- 4.6 It shall be portable in nature.
- 4.7 The machine shall be as light weight as possible.

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- 4.8 The operation and transportation of machine shall be capable by maximum 2 persons in an efficient manner.
- 4.9 The machine shall be capable of performing on different rail sections by changing the shear blades and fitting appropriate shear blades without any modification /addition/alteration to the machine. Each machine shall be fitted with one set of shear blades of desired rail section (to be specified by the purchaser).
- 4.10 Clamping force, shearing force and shear blades shall be centred on the rail head giving/ensuring in line push.
- 4.11 Four way direction control valve shall be capable of reversing the direction of the movement of shear blades through the power provided by hydraulic pump.
- 4.12 The hydraulic stroke and internal clearances of weld trimmer shall be such that sand mould can be accommodated inside unless agreed otherwise between manufacturer/supplier and Railway Board/RDSO/purchaser.
- 4.13 A set of shear blades shall be capable of trimming at least 200 A.T. Weld joints before they are due for retipping.
- 4.14 Motorised hydraulic pump shall have an in-built manually operated hand pump/ device for retrieving the shear blades in case of failure of power pack.
- 4.15 All exposed surface shall be painted with yellow paint of standard quality to protect it from rusting and other weathering effects.
- 4.16 **HANDLING AND TRANSPORTATION ARRANGEMENT:**

The machine shall have mono rail double flanged wheels arrangement (two axles) at the bottom and a handle of convenient height (preferably adjustable height) to enable it to be pushed over the rail by one person assisted by another to take it to the work site. Nylon wheels should also be attached either side to be moved on cress/plain surface as required. The diameter and thickness of the nylon wheels shall be such that they do not infringe check rails or the ballast adjoining the rail heads.

Or

The machine should be capable of being transported to site by 'Rail Dolley' by suitable attachment. The necessary attachment will be supplied by the manufacturer along with machine.

Or

The machine should be capable of being transported to site by a suitable mono rail trolley having double flanged wheels and handle of convenient height (preferably adjustable height) to enable it to be pushed over the rail by one person assisted by another person. Flanges should be of such thickness so as not to infringe check rails and ballast near the rail head. Nylon wheels should also be attached at either end of the double flanged wheels to enable the machine to be moved on cress/plain surface as required. The necessary mono rail trolley shall be supplied by manufacturer along with the machine.

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5.0 TECHNICAL REQUIREMENT:

5.1 The machine shall complete trimming operation after setting the machine within the time indicated below:

- A) Trimmer with hand operated pump:
 52 kg 72 UTS & 90 UTS rails - 02min
 60 kg 72 UTS & 90 UTS rails - 03 min
- B) Trimmer with motor driven pump:
 All rail sections including 60 kg, 90 UTS - 01 min

5.2 Following are the permissible tolerance after completion of trimming action w.r.t standard dimensions:

- i) Top of rail head + 0.5 mm to +1.5 mm
 ii) Width of rail head + 1.0 mm to + 2.0 mm

5.3 The weight of the weld trimmer excluding hydraulic pump shall not be more than 95 kg. The total weight of the equipment inclusive of hydraulic pump shall not be more than-

- a) For manual driven - 100kg
 b) For motor driven - 175 kg

Weight mentioned above includes weight of hydraulic hoses, its connections and mono rail wheel attachment for transportation.

5.4 The minimum shearing force provided by hydraulic cylinders shall not be less than – 18t.

5.5 The hydraulic stroke shall be 120-150 mm.

5.6 For motor driven hydraulic pump, the petrol/diesel engine shall be of standard make, compatible to use with hydraulic pump and shall have a minimum rating of 3 H.P. The compatibility of engine with the hydraulic pump should preferably be certified by the engine manufacturer or his authorised dealer/agent.

6.0 WORKMANSHIP AND FINISH:

6.1 All the metal surfaces shall be properly finished. Rough and sharp edges shall be removed.

6.2 All the working parts and the parts subject to wear shall be accurately machined to such tolerance as will ensure the fitting of spares with minimum of adjustment.

7.0 TESTS (This clause is not applicable for Hand operated Weld Trimmer):

Prototype Test at the time of initial approval:

Following type test are to be conducted on Prototypes at the time of initial approval. The manufacturer/supplier shall produce **two prototype** samples before inspecting officials for type tests. The cost of type tests shall be borne by the manufacturer/supplier. All arrangement to conducts type tests shall be made by manufacturer/supplier.

PROTOTYPE TESTING SEQUENCE: Type test (on two Samples)

i)	Visual and dimensional test	: Both samples
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ii)	Rated pressure test (on hydraulic cylinder/ equipment)	: Both samples
iii)	Proof pressure test (on hydraulic cylinders/equipment)	: Both samples
iv)	Performance test (on hydraulic cylinders/equipment)	: For 100 no cycles on 1 st samples and for 25 cycles on 2 nd sample.
v)	Rated pressure test (repeat)	: Both samples
vi)	Weld cutting test for minimum 40 weld joints	: On equipment subjected to performance test for 100 cycles.

Note: Welding shall be arranged by Railways for Weld cutting Test.

7.1 **Visual and Dimensional Test:**

7.1.1 The equipment shall be free from defects such as crack, blow holes etc. The equipment shall be checked dimensionally as per drawing of manufacturer approved by purchaser/RDSO.

7.1.2 Thickness and uniformity of Chrome plating on cylinder piston rod as mentioned in clause 3.5 shall be measured with the help of 'Alco' meter.

7.1.3 Hydraulic cylinders shall be checked for hydraulic stroke.

7.2 The following tests shall be carried out for testing shearing force of the weld trimmer. During these tests the shearing force shall be applied when piston is in fully open position:

7.2.1 Rated Pressure Test: The hydraulic cylinders/equipment shall be loaded upto its rated capacity and shall be kept steady for 1 hour; the pressure at the end of 01 hour shall not be less than 95% of rated capacity.

7.2.2 Proof Pressure Test: The hydraulic cylinders/equipment's shall be loaded up to 120% of rated capacity for pushing pressure and shall be kept steady for 5 minutes, the drop in pressure shall not be more than 10% of rated pressure at the end of this period. After this test, the hydraulic cylinders shall operate smoothly throughout the range without any slip or visible damage and shall not show any sign of leakage of oil or any other abnormality.

7.2.3 Performance Test:

7.2.3.1 The hydraulic cylinders/equipment which has successfully passed rated pressure test and proof pressure test shall be used for this test.

7.2.3.2 The hydraulic cylinder/equipment shall be subjected to 100% rated capacity for pushing force and shall be kept steady for 2 minutes. After 2 minutes piston rod of cylinders shall be retracted fully and again worked from minimum to maximum position. This cycle shall be repeated 100 times with an interval of 10 minutes between each cycle. After completing the 100 cycles in this manner, the hydraulic cylinder shall work smoothly throughout the range without undue play between moving parts and without any leakage.

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7.2.4 Rated pressure Test (Repeat):- After completing the cycle test as mentioned in para 7.2.3 the hydraulic cylinders/ equipment shall again be subjected to rated capacity test as mentioned in para 7.2.1 and shall be in conformity with it. After this test the hydraulic cylinder/ equipment shall not show any sign of distortion or leakage of oil.

After completing the rated pressure (repeat) test, the equipment shall be left for a period of 12 hours (min.), after this equipment shall not show any distortion, bulging, leakage or any other defect.

7.2.5 Weld Cutting Test: The equipment which has passed the test mentioned in 7.2.1 to 7.2.4 shall be subjected to this test. Thermit welding shall be done in the particular rail section for which the equipment is offered for the inspection (as per requirement of purchaser) and after 3 to 4 minutes of pouring hot weld metal, the excess weld metal on top and sides will be removed/ trimmed with the help of weld trimmer. Trimmer shall work smoothly and shall give a weld finish in the tolerance specified in clause 5.2 without any crack or gauging in the weld.

7.3 For definition of terms rated pressure and proof pressure used in clause 7.2.1 and 7.2.2 IS: 10585-1983 (2002) (method of test cylinders for oil hydraulic system) may kindly be seen.

7.4 Before offering the equipment for inspection and testing, manufacturer shall satisfy himself regarding performance of his equipment and shall give a certificate specifically mentioning that he has checked and tested hydraulic cylinder of each equipment as per IS : 10585 : 1983 or equivalent BS/ISO specification and it satisfy its provision.

Manufacturer/supplier shall also give the information/data's w.r.t. hydraulic cylinders used in equipment on Performa attached as **annexure-II** (table –I of IS-11337-1985 Reaffirmed 2018).

7.5 Acceptance Test:

Acceptance tests are to be conducted inspection against Zonal Railways/purchasers purchase order.

i)	Visual and dimensional test	: Every equipment (as per clause 7.1)
ii)	Rated pressure test (on hydraulic cylinder/ equipment)	: Every equipment (as per clause 7.2.1)
iii)	Proof pressure test (on hydraulic cylinders/equipment)	: Every equipment (as per clause 7.2.2)
iv)	Performance test (on hydraulic cylinders/equipment)	: One out of every 10 (ten) or part thereof for 25 cycles. (as per clause 7.2.3)
v)	Rated pressure test (repeat) (on hydraulic cylinders/equipment)	: On equipment subjected to performance test (as per clause 7.2.4)
vi)	Weld cutting test on one weld	: On equipment subjected to rated pressure (repeat) test. (as per clause 7.2.5)

Note:

1. Welding for Weld cutting test shall be arranged by Railways.
2. Shear blades shall be examine after cutting test and it shall be in same condition as it was before the cutting test.

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7.5.1 Any of the equipment which fails in the testing as per sequence given in clause 7.5 shall be rejected. However is the equipment subjected to performance test, rated pressure test (repeat) or weld cutting test mentioned in 7.2.3, 7.2.4 and 7.2.5 fails, the inspecting officer may reject whole lot or pass each equipment after subjecting it to performance test and weld cutting test. For rejection purpose, 10 nos. equipment or part there of (say if procurement is for 6 nos. it will constitute one lot only, if procurement is for 16 pieces, first 10 pieces will constitute one lot and remaining 6 pieces will constitute second lot) will constitute one lot.

7.5.2 The equipment subjected to acceptance performance test shall be picked up randomly.

7.5.3 Before offering the equipment for inspection and testing, manufacturer shall satisfy himself regarding performance of his equipment and shall give a certificate specifically mentioning that he has checked and tested hydraulic cylinder of each equipment as per IS : 10585 : 1983 or equivalent BS/ISO specification and it satisfy its provision.

Manufacturer/supplier shall also give the information/datas w.r.t. hydraulic cylinders used in equipment on proforma attached as **Annexure-II** (table –I of IS-11337-1985 Reaffirmed 2018).

8.0 INSPECTION:

Inspection of the Trimmer against Zonal Railways purchase order shall be carried out by purchaser of Zonal Railway or any representative /agency authorized by CTE. The cost of inspection and testing shall be borne by the manufacturer/supplier. Copies of maker's test certificate guaranteeing the performance of the machine shall be supplied in duplicate along with each Trimmer. Minimum level of inspecting official shall be SSE.

8.1 Compliance of the specification shall be verified at the time of inspection.

8.2 Clause no. 8.1 is applicable for item Hand Operated Weld Trimmer.

9.0 TOOLS & SPARES

9.1 Tools: Each machine shall be supplied with a complete kit of tools required by the operator in emergency and for normal working of the machine.

9.2 Spares:

9.2.1 Two spare set of hydraulic seals and hoses with necessary quick release coupling will be supplied free of cost by the manufacturer along with the machine.

9.2.2 The manufacturer shall be responsible for the subsequent availability of spares to ensure trouble free service for the life of the machine.

9.2.3 Manufacturer shall provide the complete details along with the one set of SIMS to adjust the angle of shear blades for giving required tolerances in service.

9.2.4 The spare parts required time to time should be detailed in a list indicating description, part number, and source of procurement and expect life.

9.2.5 The manufacturer/supplier shall mention the cost of shear blade (new) for various sections of rails as well as cost of re-tipping. The manufacturer will also mention the minimum number of cuts after which its re-tipping and change of blade is required and shall also give a guarantee to this effect.

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10.0 MARKING & PACKING:

10.1 Marking:

The machine shall be legibly and indelibly marked with:

- i) Name/Trade mark & contact no of manufacturer.
- ii) Serial No. of equipment.
- iii) Month and year of supply.

10.2 Packing:

The equipment shall be supplied packed in suitable wooden crates according to best trade practices to safely transport by rail/ road and reach the consignee in safe and satisfactory manner. All the working parts shall be oiled before being assembled.

11.0 INFORMATION TO BE SUPPLIED BY MANUFACTURER WITH CONSIGNMENT AS WELL AS AT THE TIME OF TENDERING:

11.1 The following information shall be supplied by the manufacturer to the purchaser/consignee along with the machine.

11.1.1 Manuals: Details operating manual, safety precautions to be taken, maintenance and service manuals shall be supplied in three copies along with each machine.

11.1.2 Maker' Test Certificate:

11.1.2.1 Copies of the maker's certificate guaranteeing the performance of the machine should be supplied in duplicate along with delivery of each machine.

11.1.2.2 Copies of the engine manufacturer's certificate guaranteeing the performance of engine for the machine shall be supplied along with maker's certificate mentioned in 11.1.2.1. The guarantee of the engine shall be in favour of consignee.

11.1.3 Drawings: The manufacturer shall supply detailed drawings exhibiting clearly the materials and dimension so that the user can have a clear understanding of the machine.

11.1.4 List of tools with sketches for easy identification and use.

11.1.5 Manufacturer/supplier shall specify nos. of weld after which the shear blades has to be re-sharpened and re-tipped. Manufacturer will also specify the procedure (with sketches) of re-sharpening of tools and also indicate the agency/agent for re-tipping services.

11.2 The following information shall be supplied by the manufacturer to the purchaser at the time of submission of tender/offer:

- i) Nos. of A.T. Weld joint after which shear blades requires re-harpening.
- ii) Nos. of A.T. Weld after which shear blades requires re-tipping.
- iii) Complete life of shear blades i.e. nos. of days after which it requires replacement.
- iv) Cost of i, ii,iii and agency from which the work is required to be one.

12.0 WARRANTY & AMC:

12.1 Any part of the machine failing or proving unsatisfactory in service due to defective design, material or workmanship within 12 months from the date of supply shall be

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replaced by the supplier at his own expenses. Further should any design modification be made in any part of the equipment offered, the period of 12 month would commence from the date of the modified part is commissioned in service.

- 12.2 The petrol/diesel engine fitted in motor driven hydraulic pump shall also be guaranteed for a period of 12 months from the date of supply of machine. This guarantee shall be from the engine manufacturer in favour of consignee for using the engine with weld trimmer otherwise machine manufacturer/supplier shall get a letter released from the engine manufacturer to its service centre mentioning that guarantee of the engine in favour of machine manufacturer should be treated as a guarantee in favour of consignee and therefore local service centre should render all the services as provided to direct purchaser.

13.0 TRAINING, AND COMMISSIONING:

- 13.1 Adequate training in operation and maintenance of the machine shall be imparted to railway operators by the manufacturer either at manufacturer's premises or at railway premises, as per the convenience of the purchaser, at the rate of two operators per machine.
- 13.2 The manufacturer/supplier shall commission and demonstrate one machine to the consignee/purchaser at a date & place fixed in consultation with purchaser. The manufacturer/supplier shall inform all the consignee (if there is more than one consignee) about the date & place of commissioning fixed in consultation with purchaser. The demonstration & commissioning shall be only for one machine for the entire supply.

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ANNEXURE-I

SPECIFICATION OF OIL SEALS:

The hydraulic oil seals when tested in accordance with ASTM D-2000 shall conform to following specifications:

	Base polymer	Nitrile Rubber
1.	Maximum operating temperature	80 ⁰ C
2.	Test Method	ASTM D 2000
3.	Hardness (shore A)	70 ± 5
4.	Tensile strength (MPQ) min.	12
5.	Elongation at break (%)	250
6.	Accelerated ageing characteristics	
a)	Change in properties after hot air ageing at 100 ± 1 ⁰ C for 72 + 0 hrs. - 2	
	i) Hardness (Shore A)	+ 10 - 0
	ii) Tensile strength (%)	+ 0 - 20
	iii) Elongation at break (%)	+ 0 - 40
b)	Change in properties after immersion in ASTM oil at 100 ± 1 ⁰ C for 72 + 0 hrs. - 3	
	i) Hardness (Shore A)	+ 10 - 5
	ii) Tensile strength (%)	+ 10 - 20
	iii) Elongation at break (%)	+ 10 - 40
c)	Swelling test:	
	i) Percentage change in volume in ASTM oil at 100±1 ⁰ C for 72 + 0 hrs. - 3	+ 5 - 10
	ii) Percentage change in volume in grade NIGL-2003 at 100± 1 ⁰ C for 72 + 0 hrs. - 3	+ 15 - 2
7.	Compression set (%) max. at 100 ± 1 ⁰ C i) For 24 + 0 hrs.-2 ii) For 72 + 0 hrs.	20 35
8.	Tension set at 100 ⁰ C, 80% stretches 24 hrs.	20%

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IS 11337: 2002**Annexure-II**

**Table 1 Proforma for Purchase Specification for Hydraulic Cylinders
(Clauses 6 and 7)**

1. Cylinder Type: Single acting/Double acting/Telescopic/Any other
Ram _____
2. No. of stages (in case of telescopic cylinders) _____
3. Sizes, mm: Bore _____ Rod _____ Stroke _____
4. Fluid media: Aqueous/Mineral oil/Oil in water/Water in oil/Ester/Any other
5. Ratings:
 - 5.1. Pressure, kgf/cm²: Max working pressure _____ Rated pressure _____
 - 5.2. Velocity, m/s: Max working speed _____
 - 5.3. Temperature, °C: Working temperature range: Min _____ Max _____
6. Installation: Horizontal/Vertical/Inclined
7. Mounting :

MF1- Rectangular flange, head mounting	MF2- Rectangular flange, cap mounting
MF3- Circular flange, head mounting	MF4- Circular flange, cap mounting
MP3- Fixed eye cap mounting	MP4- Detachable eye cap mounting
MP5- Fixed eye with spherical cap mounting	MP6- Detachable eye with spherical bearing cap mounting
MT1- Male trunnion, head	MT2- Male trunnion, cap mounting
MT3- Male turunnion, central mounting	Any other style with dimensional drawings
MT4- Intermediate fixed or movable trunnion (male)	
MX1- Both ends studs or tie rods extended	
MX2- Cap studs or ties rods extended	
8. Rod end: Eye/Thread/Clevis/Lock nut/Any other
9. Load details:
 - 9.1. Condition: Steady/Mild shocks/Heavy shocks
 - 9.2. Holding: Extension/Retraction/None
 - 9.3. Duty: Light/Medium/Heavy
 - 9.4. Operation: Infrequent/intermittent/Continuous
 - 9.5. Side load details, if any
10. Cushioning details:
 - 10.1. Head end cover
 - 10.2. Cap end cover
 - 10.3. Length
 - 10.4. Speed
11. Environmental: acid vapor/Dust/Hard particles/Mud/Water/Snow/ Tropical/ Vibration/ Molten metal/ Any other.
12. Primer/Paint Specify:
13. Safety requirements Specify:
14. Special requirement if any, for example Tolerance/Accuracy, etc.
15. Testing requirements Specify: Proof pressure test/Static internal leakage/Static friction test/Endurance test/Any other test.
16. Name plate/Punching/Identification details Bore _____ Rod _____ Stroke _____ Working pressure _____ Manufacturer's reference number _____ year of manufacture _____
17. Packaging Specify:
18. Labelling, if any

Signature of the purchaser _____
Name of the Purchaser _____
Name and address of the Company _____

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