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हाइड्रोलिक आवेग उपकरण — विशिष्टि

Draft Indian Standard

HYDRAULIC IMPULSE TOOLS — SPECIFICATION

ICS 23.140.10

Pneumatic and Hydraulic Tools Sectional Committee, PGD 08 Last date of comment is

FOREWORD
(*formal clauses will be added later*)

This standard was first published in 2023.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'.

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SPECIFICATION FOR HYDRAULIC IMPULSE TOOLS

1 SCOPE

1.1 This Indian Standard covers general requirements for Hydraulic automatic shut-off impulse tools and Hydraulic non-shut-off impulse tools.

1.2 This standard covers Hydraulic automatic shut-off impulse tools suitable for applications up to M14 and Hydraulic non-shut-off impulse tools suitable for applications up to M24.

1.3 These hand held hydraulic impulse assembly tools are intended for use by one operator and supported by the operator's hand or hands, with or without a suspension.

2 REFERENCES

The following standards contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
IS 196: 1966	Atmospheric conditions for testing (*revised*)
IS 8669 : 2014	Assembly tools for screws and nuts - Drive ends for hand - and machine - Operated screwdriver bits and connecting parts - Dimensions, torque testing (*second revision*)
IS 554 : 1999	Pipe threads where pressure - Tight joints are made on the threads - Dimensions, tolerances and designation (*fourth revision*)
IS 7936 : 1976	Sizes for Redial Drilling Machines (Withdrawn)
IS 11609 : 1986	Technical supply conditions for pneumatic tools

3 TERMINOLOGY

3.1 Gauge Pressure — A steady dynamic pressure (on load operating air pressure) of compressed air measured on the gauge located within three meters from the inlet to the Hydraulic impulse tools.

3.2 Maximum Air Consumption on Free Run I.E. on no Load Condition — Volume of air corrected to standard atmospheric conditions of temperature and pressure according to IS 196: 1966 consumed by the Hydraulic impulse tools without any fluctuations of pressure during the test.

3.3 Hydraulic Impulse Tool — A power assembly tool fitted with a motor driving a hydraulic impulse mechanism for tightening threaded fasteners, which applies torque through a hydraulic impulse unit to a fastener in discontinuous increments.

3.4 Hydraulic Automatic Shut-off Impulse Tool — Hydraulic impulse power tool with a device that shuts off or disconnects the power to the tool when a predetermined output level is attained

3.5 Hydraulic Non-Shut-off Impulse Tool — Hydraulic impulse power tool which continues to apply torque impulses as long as power is applied to the tool

3.6 Hydraulic Electronically Controlled Impulse Tool — Hydraulic impulse power tool with electronic control of the shut-off mechanism

3.7 Straight Hydraulic Impulse Tool — Hydraulic impulse tool with a coaxial motor, handle and output spindle axis (*see* Figure 1 below).

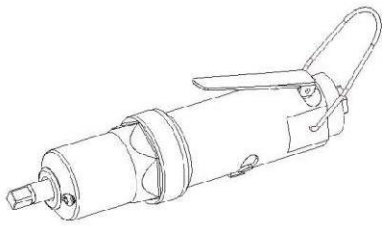


FIG. 1

3.8 Pistol Hydraulic Impulse Tool — Hydraulic impulse tool with pistol type handle body (*see* Figure 2 below).

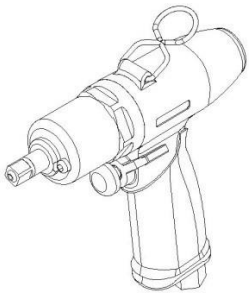


FIG.2

3.9 Angle Drive Hydraulic Impulse Tool — Hydraulic impulse power tool with the output spindle at an angle to the motor axis (*see* Figure 3 below).

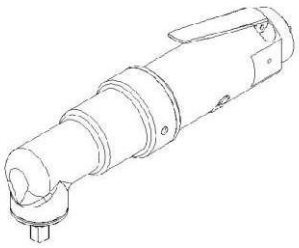


FIG. 3

3.10 Hydraulic Impulse Tool with Grip Type Handle — Hydraulic impulse power tool with D type handle (*see* Figure 4 below)

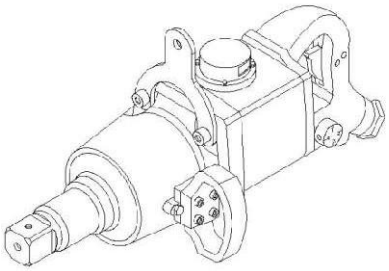


FIG. 4

3.11 Start-and-Stop Device/Throttle — Manually operated control on the assembly power tool for threaded fasteners by which the energy supply to the motor can be turned on and off.

3.12 Rated Air Pressure — Air pressure, required at an air tool inlet port to assure rated performance of the tool, also considered the maximum pressure at which the tool may be operated.

3.13 Rated Speed — Speed of an air tool at no load and rated air pressure at the tool inlet port.

NOTE — The rated speed is expressed in revolutions per minute.

3.14 Suspension Device — Device, which is attached to the tool and when the same is connected together on a spring balancer or articulating arm, by doing so primary purpose is to reduce the strain on the operator caused by the weight of the tool which enhances ergonomics.

4 TYPES

4.1 Based on direction of rotation

a) Type NR — Non-reversible
b) Type R — Reversible

4.2 Based on design of handle (*see* Fig. 1,2,3,4)

a) Straight Type (Fig. 1)
b) Pistol Type (Fig. 2)
c) Angle Type (Fig. 3)
d) Grip Type (Fig. 4)

4.3 Based on type of anvil

a) Square type anvil (Fig.5)
b) Driver type anvil (Fig.6)

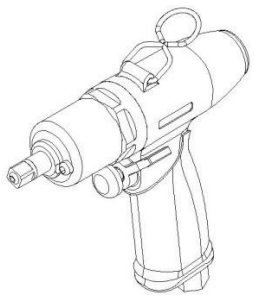


FIG. 5

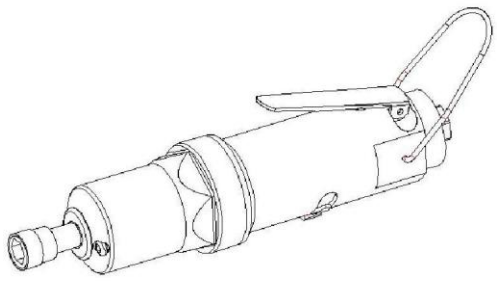


FIG. 6

5 MATERIAL, WORKMANSHIP AND FINISH

Material shall be of uniform quality and shall be free from defects and imperfections that might affect the serviceability of the finished product.

The hydraulic impulse tool shall be free from harmful flaws, crack, burrs and other imperfection and shall be finished satisfactorily.

6 PERFORMANCE CHARACTERISTICS OF HYDRAULIC AUTOMATIC SHUT-OFF IMPULSE TOOLS

Capacity Bolt Size	Free Speed	Torque Adjustment Range		Square Drive Shank	Weight	Overall Length	Air Inlet Thread	Air Hose Size	Air Pressure
mm	RPM	Min. N-m	Max. N-m	mm	kg	mm	BSP	mm	Kg/Cm^2
M5	7500	9	15	9.5	0.9	171	1/4"	9.5	6
M8	7000	20	35	9.5	1.25	184	1/4"	9.5	6
M8	7000	18	32	6.35**	1.25	189	1/4"	9.5	6
M8	6500	20	35	9.5	1.2	232	1/4"	9.5	6
M8	6500	18	32	6.35**	1.2	237	1/4"	9.5	6
M8-M10	6000	40	60	9.5	1.4	206.5	1/4"	9.5	6
M8-M10	6000	40	57	6.35**	1.4	209	1/4"	9.5	6
M8-M10	6000	40	60	9.5	1.4	257	1/4"	9.5	6
M10-M12	6000	85	110	12.7	2.3	216	1/4"	9.5	6
M14	4800	120	210	19	4.0	260	3/8”	12.7	6

** Suffix the above tools with 'D' for Driver Type Anvil- D according to IS 8669 : 1992

7 6 PERFORMANCE CHARACTERISTICS OF HYDRAULIC NON-SHUT-OFF IMPULSE TOOLS

Capacity Bolt Size	Free Speed	Torque Adjustment Range		Square Drive Shank	Weight	Overall Length	Air Inlet Thread	Air Hose Size	Air Pressure
mm	RPM	Min. N-m	Max. N-m	mm	kg	mm	BSP	mm	Kg/Cm^2
M5	7500	9	15	9.5	0.81	139	1/4"	9.5	6
M5	7500	8	13	6.35**	0.82	147.5	1/4"	9.5	6
M5	8000	9	15	9.5	0.95	220	1/4"	9.5	6
M5	8000	8	13	6.35**	0.96	225	1/4"	9.5	6
M6-M8	6500	25	35	9.5	0.95	155	1/4"	9.5	6
M8	7000	15	35	9.5	1.19	146	1/4"	9.5	6
M8	7000	15	30	6.35**	1.19	151	1/4"	9.5	6
M8	8200	15	35	9.5	1.2	221	1/4"	9.5	6
M8	8200	15	30	6.35**	1.2	226	1/4"	9.5	6
M8	7000	15	35	9.5	1.64	256	1/4"	9.5	6
M8-M10	6000	35	70	9.5	1.3	168	1/4"	9.5	6
M8-M10	6000	30	60	6.35**	1.3	171	1/4"	9.5	6
M8-M10	6500	35	70	9.5	1.25	245	1/4"	9.5	6
M8-M10	6500	30	60	6.35**	1.25	250	1/4"	9.5	6
M8-M10	5500	30	60	9.5	1.8	292	1/4"	9.5	6
M12	5800	70	120	12.7	2.04	196	1/4"	9.5	6

M16	2800	120	200	12.7	3.65	210	1/4"	9.5	6
M18	2400	200	300	19.05	4.9	240	3/8"	12.7	6
M18-M20	4000	300	400	19.05	6.5	270	3/8"	12.7	6
M24	3500	300	550	25.4	12.5	443	3/4"	12.7	6

** Suffix the above tools with 'D' for Driver Type Anvil- D according to IS 8669 : 1992.

8 GENERAL REQUIREMENTS

8.1 Lubrication

Arrangement shall be made to lubricate bearings, gears and other moving parts not lubricated from the inline oil lubricator.

8.2 Air Inlet Connection

8.2.1 Air inlet connection shall be fitted with an air strainer or screen which shall be effective in retaining solid particles from compressed air supply. Moreover, it shall be possible to clean the strainer/screen easily.

8.2.2 Air inlet connection shall have pipe threads conforming to IS 554.

8.2.3 The position of the air inlet connection shall not hinder working of tool when connected with air hose.

8.3 Throttle

8.3.1 Design of throttle shall be provided for admitting and shutting the supply of compressed air.

8.3.2 Design of throttle shall be such that an operator shall be able to operate the tool easily with the fingers.

8.3.3 Design of Throttle should be Ambidextrous.

8.3.4 Non-leakable reversing throttle shall be provided for reversible tools. The mechanism shall operate smoothly in reversing the operation.

8.4 Suspension Link:

It should have means of suspending the tool during operations.

8.5 Bearings

Bearings shall be suitably housed and adequately sealed to prevent leakage of lubricant and entrance of dirt and dust.

8.6 Spindle

8.6.1 *For Square Type Anvil*

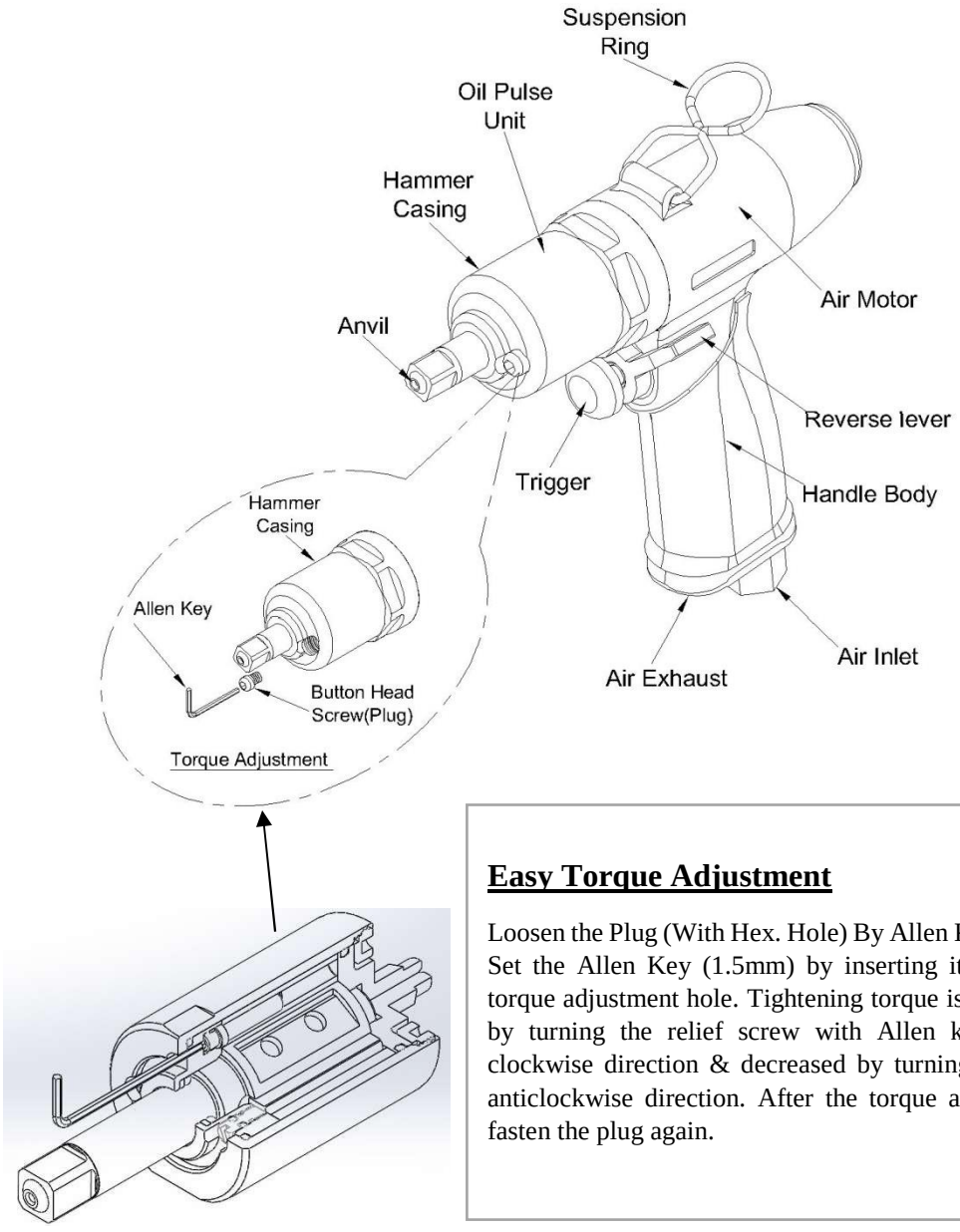
The driving square of the spindle shall be wear-resistant. The driving square, when fitted with a suitable socket, shall not show excessive run-out which may adversely affect operation of the wrench. The driving square shall conform to IS 7936.

8.6.2 *For Driver Type Anvil*

The driving hexagon of the spindle shall be wear resistant. The driving hexagon, when fitted with a suitable tool bit shank, shall not show excessive run out which may adversely affect operation of the tool.

8.7 Ease of Torque Adjustment

Torque should be easily set by Allen key externally without dismantling the tool.



Easy Torque Adjustment

Loosen the Plug (With Hex. Hole) By Allen Key. Then, Set the Allen Key (1.5mm) by inserting it in to the torque adjustment hole. Tightening torque is increased by turning the relief screw with Allen key in the clockwise direction & decreased by turning it in the anticlockwise direction. After the torque adjustment, fasten the plug again.

9 OPERATION

9.1 For rated performance of hydraulic shut-off impulse tools, the stable dynamic air pressure at the inlet of tool when it is running should be 6 ± 0.5 bar.

9.2 For rated performance of hydraulic non shut-off impulse tools, the stable dynamic air pressure at the inlet of tool when it is running should be 6 ± 1 bar.

9.3 Inlet air should be prepared i.e. it should be dry, clean & lubricated.

9.4 Before calibrating the tool for torque, run the pulse tool on load at least 10-20 seconds to bring the pulse unit to the working condition. Then measure the applied torque & adjust the torque setting if required as per application need.

9.5 Always set up a hydraulic impulse tool at the application, using the same hoses, sockets and air pressure that will be used in normal running conditions.

9.6 Machine shall not get excessive heated up when continuously operated for eight hours minimum.

9.7 No twisting thrust or reaction should be experienced by the operator during operation.

9.8 The tools shall be reversible. The rotational direction of the tool shall be controlled by a conveniently located mechanical device independent of throttle.

10 INSTRUCTION MANUAL

An instruction manual shall be supplied with each tool. Data to be provided in the instruction manual shall be in accordance with IS 11609.

11 TESTS

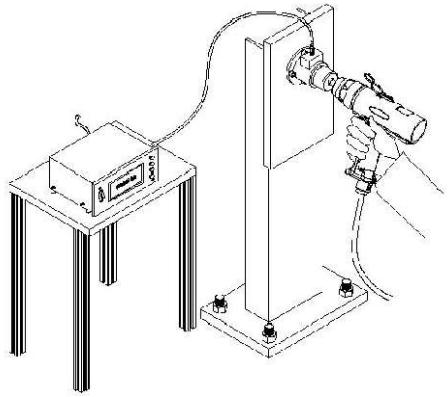
11.1 Air Consumption Test

The air flow meter or any other equally suitable instrument shall be used to determine the quantity of the air consumed per minute at 6 ±0.5 bar pressure measured at a distance of not more than three metres from the tool.

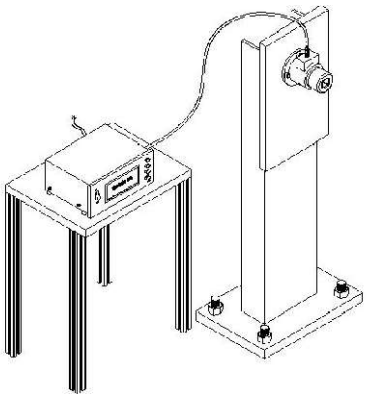
11.2 Performance Test

11.2.1 A hydraulic impulse tool shall be tested for rated torque at an air pressure of 6 ±0.5 bar.

11.2.2 The test shall consist of operating the hydraulic impulse tool on a load cell or on a screwing joint simulator connected to digital display showing the value of torque delivered by the tool.



PERFORMANCE TEST



LOAD CELL

11.2.3 The load test shall be carried out on one percent of the total ordered quantity, the minimum being one for an order of 50 or more. The load shall be applied on a hydraulic impulse tool under test after preliminary run of not less than 5 to 10 seconds

11.3 Operational Test

Every tool shall be tested for easy starting and stopping for at least 50 times (ON-OFF cycles) in each forward and reverse direction. It shall also be tested for easy fitment and removal of the impact socket/ tool bit shank on the hexagon drive. During testing, there shall be no abnormal noise or excessive temperature rise. The machine shall show no flaws developed during testing.

11.4 Endurance Test

11.4.1 *For Type Approval*

Each sample shall be put on extensive run down on automatic testing machine for 500,000 cycles. After completion of the cycles, the tool shall be dismantled and all parts examined. No part shall either break during field use or shall be found, cracked, deformed or show signs of excessive wear on examination.

The quality of pulse unit oil needs to be verified.

11.4.2 The test as per 10.4.1 shall be carried out by the manufacturer before a new product is marketed or any changes are made in design or materials in the existing product. A type approval certificate shall be supplied by the manufacturer to the purchaser, if asked for.

12 PACKING AND MARKING

Before packing, the inlet, exhaust and other openings of each tool shall be adequately protected against entry of dust and other harmful material. Packing shall be done in accordance with IS 11609.

13 MARKING

The screw driver/nut runner shall be marked with

a) Model name,
b) Serial number,

c) Maximum working pressure,
d) Torque range and
e) Source of manufacture or trade-mark at a suitable location.

13.1 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the standard mark.