



1. GENERAL :

- 1.1 INTRODUCTION: This standard covers basic mechanical requirements for mechanical single, double, and multiple action straight side stamping presses, manufactured to both metric (SI) and English (customary) measurement systems, for use worldwide.

This standard is intended to be supplemented with additional local requirements for mechanical, electrical, hydraulic, pneumatic, lubrication, and safety.

This worldwide press standard has been developed cooperatively by Ford of Europe, Ford North American Automotive Operations and Manufacturing Staff for the purpose of obtaining a sound basis for accurate comparison of quotations, similar maintenance standards, to minimize spare parts inventories and to provide maximum production flexibility.

If a supplier considers that a better alternative can be offered, this should be described in detail as an addition to the original quotation.

The standards issued are not intended to cover all construction details. It is expected that suppliers will comply with established standards and codes of practice for machine construction, and any specialized techniques and standards applicable in the manufacture of power presses.

It is the responsibility of the supplier to be aware of, and to comply with, any statutory regulations applicable in the country of installation. This is especially important with regard to the provisions of safety devices and guards, etc., even if these are not specifically mentioned in any section of the standards.

All equipment is to be supplied in accordance with the specification standards, drawings, and information referred to in the Purchase Order.

It is the responsibility of the equipment supplier to ensure that all necessary data and information is requested from Ford, to enable the equipment to function efficiently with minimum maintenance.

It is expected that presses supplied to these standards will provide a working life of at least (30) years operating on a (3) shift system assuming correct usage and maintenance.



1.2 PREPARATION OF QUOTATIONS:

1.2.1 GENERAL: The basis of a quotation is to be the Ford Specification for Mechanical Presses" supplied with the inquiry, which must be completed by the supplier.

The supplier's signature on the form will be taken as meaning that all specifications, standards, statutory requirements, and information as described in the Introduction have been considered and included in the proposal.

If the supplier is unable to met any specifications, he shall draw special attention to this and request permission from Ford for any deviation. Rectification of a deviation not approved will be the responsibility of the supplier. In the event of a dispute arising in the execution of an order, the specifications and standards issued by Ford will be regarded as obligatory and binding.

If a more detailed description of the equipment, or additional technical information is required, this shall be requested in the section of the Specification headed "Regulations, Standards, and Drawings"

1.2.2 DETAILED PRICES: Prices are to be broken down and detailed according to the relevant Specification sheet.

The price for "Electrical Equipment" should include all items which are the procurement responsibility of the supplier, including the complete internal wiring of the press and the interconnection between the press and the main control cabinet.

If the main control panel is not contained in the press structure the supplier should assume for quoting, that the main electrical cabinets are situated on balconies (5) meters from the press upright at a height of (3) meters above floor level.

Wherever electrical equipment is supplied by Ford, such as the main motor or light barriers, the installation cost for this is to be included in the Electrical Equipment price.

The initial fill of press lubricant and hydraulic oil in the Ford plant will be supplied by Ford.



The installation cost of the press is to include the supplier's provision of all necessary labor, tools and tackle to unload, assemble, test run and commission all equipment to the satisfaction of Ford engineers. No assistance will be available from Ford facilities, with the exception of the use of over-head travelling cranes and operators. (Usage of cranes can be temporarily limited by requirements of Ford production or other press suppliers).

The capacity and effective operating areas of the cranes are shown in the relevant plant layouts provided by Ford. If the lifting capacities of the cranes are insufficient, the press supplier is to ensure that his erection and assembly costs include the provision of such additional lifting facilities as required.

(See Standards Section on Shipping, Installation, and Painting)

The time required for press installation, from delivery into the Ford Plant until ready for acceptance by Ford engineers, should not exceed (4) weeks for a single action or (6) weeks for a double action press.

The timing for multiple press orders will be determined by individual arrangements between Ford and the Supplier.

If swinging arm extractors are specified, they will be supplied by Ford, but are to be installed by the press manufacturer. Allowance for the installation cost is to be made in the quotation.

When the installation is made by the press-supplier, the total price quoted on the "Specification" is for the completely installed press after acceptance test and ready for production.

### 1.2.3

DELIVERY DATE: Separate delivery dates shall be quoted as follows:

#### 1) At Supplier

Quote the date that the completed press will be available for customer pretest at the manufacturer's plant according to Section 1.6.1.



2) P.O.E. Delivery

For presses manufactured on a different continent than that of installation, quote also the date of receipt of the press at the port of entry on the continent of installation. (P.O.E. Delivery)

3) At Ford Plant

Quote the date of receipt of the completed press at the Ford Plant indicated for installation.

1.3

DRAWINGS AND INFORMATION TO BE PROVIDED WITH QUOTATION:

Preliminary information as described below is to be provided with the quotation. Drawings as requested are to be dimensioned in the measurement system specified for the basic press design, i.e. all 'metric' engineering data in (SI) units (Systems Internationale) and all English engineering data in customary units.

The language of all supplied information and data is to be that called for in the "Specification for Mechanical Presses." All drawings and data sheets, etc. are to be clearly stamped "FOR QUOTATION ONLY."

The following items are to be provided with the quotation:

- a) General Arrangement Drawing of Press: This is to show principal dimensions, in particular the foundation requirements and overall height.
- b) General Arrangement Drawing and Description of the Drive Unit: This is to show clearly the design details in clutch and brake design.
- c) Motion Diagrams: For Multiple-Action and Link-Drive-Single-Action-Presses. These are to be provided in reproducible form on Ford Form (see page 50), with respect to the slide on double action presses on the same diagram, in which case the maximum permitted distance between slide and blankholder throughout up and down stroke is to be clearly indicated.

The bottom dead center point is to be the datum at 180 degrees for the slide of single action presses and the inner slide of double action presses. On presses equipped with slow-down linkage drives, the 360° position will not coincide with the top dead center point.

- d) Force Diagram: Diagrams of pressing force against slide displacement for each slide must also be provided.
- e) Additional Engineering Information: Supplementary information that may be requested at the discretion of Ford shall be



provided.

- f) Deviations for Specification or Standards: A written list of points which are at variance with Ford requirements is to be attached, with details of the alternatives offered.

1.4 DRAWINGS, DIAGRAMS, AND TECHNICAL INFORMATION REQUIRED FOR APPROVAL AND RETENTION: Approval by the Ford Company of any drawings does not relieve the supplier from his basic responsibility with respect to accuracy and detail of the design.

All technical correspondence and discussions, etc. with the supplier are to be in the national language of the Ford engineering procuring department unless otherwise specified.

After placing an order with the selected Supplier, the following information will be provided by Ford:

- a) Press shop foundation plans and construction drawings for orders against which the press is to be installed in a standard basement type press shop line.
- b) General die space layout, giving tee-slot and air-pin layout and general design dimensions.

Unless otherwise agreed (4) weeks after receipt of these drawings, the supplier is to submit for approval (2) copies of a general arrangement and foundation drawing of the press, which is to contain the following information:

- 1) Overall major dimensions, including height above floor level, depth to lowest point below floor, and clearances required for the removal of major components, such as shafts and gears.
- 2) Details of press feet and hold-down bolts.
- 3) A sectional view of the press at floor level.
- 4) Details of pads, grooves, etc. for light barriers, safety guards and automation equipment.

The following drawings are to be submitted by the supplier for approval prior to purchase of press materials/components and/or press manufacture to minimize affect on construction, delivery, or cost if alterations area necessary.



- a) Die Space: Drawing is to show overall dimensions of the bolster face, slide face, clearances between uprights, shut heights, etc., and details of machining and layout of T-slots and air pin holes, die clamps, etc.
- b) Pneumatic and Hydraulic Schematic Diagrams: See applicable sections of this standard.
- c) Lubrication Schematic Diagrams and Table of Lubrication Points: See applicable section.
- d) Layout of Air Control Compartment: See applicable section.
- e) Detail drawings of all separately mounted all receivers and surge tanks.
- f) Clutch and Brake Design Details: See applicable section.

1.5 FURTHER INFORMATION:

- 1.5.1 SPARE PARTS LISTS: Seven copies of spare parts lists, using the form supplied for this purpose by Ford, for replacement and wear parts such as seals, bushings, bearings, valves, cylinders, packings, etc., should be submitted to Ford Motor Company as soon as the designs are completed.  
  
Spare parts lists are to be supplied as follows: (3) copies are to be in English, and the remaining (4) copies in the national language of the country of destination. Provide (2) copies of detail drawings and material specifications of all war strips, bushings, bronze bearings, etc.
- 1.5.2 TEST CERTIFICATE: Test certificates in the national language of installation location for all air receivers and hydraulic accumulators together with their relief valves, Shall be forwarded to Ford Motor Company, as soon as possible, but not later than delivery of the receiver or accumulator.
- 1.5.3 LUBRICANTS: Details of quantity and type of recommended lubricants and hydraulic oil are to be provided at least (2) months before delivery of the press. (See relevant section of this standard).
- 1.5.4 PRESS DRIVE: If the main motor is to be supplied by Ford, the supplier shall compile all necessary technical data required to specify the motor as soon as design of the press drive has been established and submit this information to the requisitioning activity.



1.5.5      ADDITIONAL DESIGN DRAWINGS: At the request of Ford, the press manufacturer shall be prepared to produce designs and drawings for discussion and approval before manufacture or order placement of parts or materials from other suppliers.

1.5.6      PROGRESS REPORTS: Periodic visits may be made by Ford representatives to follow-up design and construction progress. Ford representatives should be permitted access to places of manufacture for parts belonging to Ford orders.

If variation to an order are necessary, the requisitioning activity is to be informed as soon as possible, giving reasons for the changes.

Written progress reports are required by Ford Motor Company, the press manufacturer will be notified and the frequency specified.

1.5.7      OPERATION AND MAINTENANCE MANUALS: Seven (7) copies of an operation and maintenance manual for each press type are to be provided to the Procuring Department at the time of press delivery, (3) copies are to be in English and the remaining (4) copies in the language of the country of destination of the press.

The manuals are to be enclosed in a durable plastic hard cover, with stiffened spine suitable for labelling. Pages and drawings, etc., shall be easily removable and suitably sized by reduction or folding to DIN A 4 for metric presses, or 8 1/2" x 11" for English system presses.

The title of the manual is to contain:

- (i) Ford Order Number and press type
- (ii) Manufacturer's serial number and press type

Each manual is to contain the following information:

- a) Press specifications, giving details of all data as called for in the Ford "Specifications for Mechanical Presses".
- b) A general assembly drawing of the press.
- c) A foundation layout.
- d) Die space drawing, including T-slot and air pin layout, etc., of slide(s) and bolster plate(s).



- e) Detailed clutch and brake assembly drawing showing all fitting tolerances and clearances, including friction blocks.
- f) Detail assembly drawings of bed cushion, slide cushion, and counter-balance cylinders, overload protection, flywheel brake, and all adjustment systems, and all major components of these units.
- g) Drive assembly drawings.
- h) Final copies of the electrical pneumatic and lubrication diagram.
- i) Special maintenance and setting instructions for proprietary equipment and components, as required.
- j) Repair and preventive maintenance recommendations, with fault-finding and corrective action charts.
- k) Die setting instructions.
- l) Total assembled weight of the press, and breakdown showing the weight of the major components.
- m) Motion diagram on Ford form (See Page 30)
- n) Diagrams of pressing force available against distance above B.D.G. for slide and blankholder slide.
- o) List giving full identification information of all proprietary parts and components against which spares can be ordered.

## 1.6 TESTS AND INSTALLATION:

1.6.1 PRE-TEST AND INSPECTION IN MANUFACTURER'S PLANT: Each press is to be completely assembled for inspection and test with the tie-rods fully pre-tensioned. The press is to be run for (6) hours with the press control set to 'single stroke' at 80% of its continuously rated speed against a load formed by the installed bed-cushion at full stroke and air-pressure set to equal nearly the installed energy. In addition, the press will be tested at full rated tonnage against stands for (1) hour. Presses without bed-cushion will be tested under the same conditions but against a load of 100% of the rated press-tonnage at bottom dead center position for 8 hours.

The Ford procuring department must be notified at least (1) week in advance of the date for the pre-test, which shall be two weeks before the intended shipping date.



The following major tests are required and full preparations shall be made by the manufacturer for testing:

- a) Testing rated tonnage of slide(s), hydraulic overload protection and deflection of bed and slide(s) by means of hydraulic load cells, and sliding bolster system.
- b) Operation of the press slide against the bed cushion adjusted for tonnage and stroke to use the maximum available energy from the press drive, while measuring effective operating speed and % slip.
- c) Stopping time of slide, as required in Section 2.5.2 of this standard, of the main stopping brake when operated with new friction blocks, and simulated maximum permitted worn condition of blocks, at an exhausting brake air pressure of 4.5 bar. 65 psig).

Further checks will be made of the press dimensional characteristics, such as die space machining, clutch and brake clearances, adjustment ranges, slide(s) stroke, bed and slide cushion strokes, air pressures and air pressure buildup in cushions, counterbalance cylinders, etc. The press will be generally examined with regard to controls and lubrication for adherence to Ford Standards.

The results of this pre-test will determine the actual shipping date for the press and also the possible dispensation of the need for pre-tests of any subsequent presses of the same type covered by the same order. These decisions will be determined " the Ford report on the pre-test. The above pre-tests may be waived or shortened by Ford if the press is a duplicate design of a press previously supplied to Ford.

1.6.2

**SHIPPING AND TRANSPORTATION:** After receipt of instructions following a successful pre-test, or after the correction of any faults found on inspection, the press is to be shipped to the designated Ford plant for installation.

Presses are to be shipped in the largest assemblies consistent with the carrier's capability, and units are to be complete with pneumatic, electric, hydraulic, and lubrication systems intact.

If equipment must be dismantled for shipment, each component is to be marked and suitably protected to prevent ingress of foreign matter into any apertures or openings, such as pipework, etc. All machined or finished surfaces are to be adequately protected against corrosion or damage.



Wherever possible, equipment for installation into the press shop basement should be delivered as part of the first load. If the order is for a complete line of presses, all air receivers for basement installation shall be delivered at the same time as those intended for the first press wherever possible.

The commencement of delivery is to be coordinated with the Ford procuring department, who shall be given full details of the method of delivery, i.e. by rail or road, the number of rail cars or road vehicles with details of their contents and the sequence of arrival at the Ford plant.

It is the supplier's responsibility to obtain full permission from the relevant authorities for the transportation of large and heavy loads on public roads or railways, etc.

1.6.3

INSTALLATION BY PRESS SUPPLIER: When press installation by the supplier is specified, he is to ensure that responsible personnel are present to accept delivery of the equipment into the Ford plant. They will be fully responsible for the unloading of all equipment from railway cars or road vehicles and must be equipped with all necessary slings for this purpose, as these will not be provided by Ford. The supervision and performance of unloading in a correct and safe manner must be undertaken by the press supplier; no responsibility for this operation will be accepted by the Ford Company.

The press supplier is responsible for the full installation of all air receivers, oil tanks, etc. and must provide the necessary fixing bolts, brackets, and support frames.

The press supplier is responsible for loss or damage of material or equipment regardless of cause, until the completed machine is accepted and handed over to production Ford Motor Company cannot accept responsibility for the safekeeping of any tools, tackle, or equipment belonging to the press supplier.

A competent engineer is to be in attendance to supervise and direct the installation of the press. The engineer should have authority to initiate through the offices of his company the order or supply of equipment not supplied with the machine, or which has suffered damage in transit, and to organize labor required to correct faults found on the machine during installation on site.



All labor, tools, tackle, materials, equipment, and scaffolding, etc. required to erect the press is to be provided by the press supplier. For safety and housekeeping on site, the press supplier is to ensure that local national requirements are complied with. These will be made available by the Requisitioning Activity before commencement of installation.

Erection can be sub-contracted to a reputable organization who are fully experienced and equipped for this type of work. Sub-contractors' general clause of contract which are contrary to the contents of this standard or the Ford contract will not be accepted.

It is the press supplier's responsibility to ensure that all equipment and work to fully erect and commission each machine is covered by their sub-contractor's specifications.

All fabrications, castings, etc. should be dressed to present clean lines when assembled. The press should be thoroughly cleaned and free of rust, oil, or other foreign material, and fully prepared using filler where necessary before painting.

Presses are to be painted in accordance with local requirements.

1.6.4      **INSTALLATION BY OTHER THAN PRESS SUPPLIER:** If the press installation is to be carried out by Ford or others, the press supplier must provide technical representatives to assist in the installation of presses and related equipment.

1.6.5      **FINAL ACCEPTANCE TESTS AND INSPECTION:** The final acceptance tests for each press will be made at the designated Ford plant on completion of installation. These will be comprised of examinations of all functions, full dimensional checks, finish, and compliance with standards.

After satisfactory testing all electrical functions, including the correct adjustment of limit and pressure switches, and setting the slide(s) in the correct conditions for operating with respect to parallelism, vertical running and gib clearances, etc., electrical and mechanical service personnel in the press supplier's employ will be required to carry out a (48) hour test run.

The 48 hour test run is to be made with the press control set to 'single stroke' at 80% of its continuously rated speed, against a load of 80% of the rated tonnage. During the course of the test run, the following items are to be checked:



Friction block wear, temperature of clutch and brake unit, bearings and air pipework, condition of gibs, lubrication, and air leaks.

It is expected that on completion of the test run, all functions will be correctly set and adjusted, and that the press will be fully ready for inspection and hand-over for production.

## 2. MECHANICAL:

### 2.1 RATINGS:

2.1.1 LENGTH OF STROKE: The stroke of a press slide (including blankholder slide) is the actual lineal distance travelled during the down-stroke (working stroke) from its upper position (T.D.C.) to the bottom dead center (B.D.C.) position.

2.1.2 SHUT HEIGHT: The shut height is the vertical distance (stroke down, and slide adjustment up) between the slide surface and the top surface of the bed bolster plate. When the press is equipped with sliding bolster, the shut height is specified from the upper surface of the sliding bolster. (See supplement Page 38).

2.1.3 CLEARANCE BETWEEN UPRIGHTS: The clearance between uprights is the maximum unobstructed distance between the inside faces of the uprights, measured between the closest projecting items, such as gibbing, oil catchers, light fittings, etc. This represents the maximum width available for die loading.

2.1.4 MAXIMUM TONNAGE: The rams or slides are to be rated for maximum tonnage as follows:

#### DISTANCE ABOVE BOTTOM OF STROKE

##### English System Presses

##### Metric-System Presses

|                         |                      |                      |
|-------------------------|----------------------|----------------------|
| Ram or inner slide      | 12.5 mm Up (1/2" Up) | 25 mm Up (1" Up)     |
| Outer slide             | 6.5 mm Up (1/4" Up)  | 10 mm Up (2/5" Up)   |
| Ram of Blanking presses | 6.5 mm Up (1/4" Up)  | 12.5 mm Up (1/2" Up) |

2.1.5 ENERGY: The usable energy of the press including energy required for cushions in accordance with its tonnage and rating distance must be available with a maximum permitted flywheel speed loss corresponding to the rated slip of the main drive.



Unless otherwise specified, the actual energy available for work shall be equal to or greater than that calculated using the formula on Page 35. This formula assumes cushion tonnage of 1/6 rated press tonnage. Cushion tonnage in excess of this amount will be treated as a special case.

2.1.6 STROKES PER MINUTE: The rated strokes per minute of the press are to be the number of complete cycles of the slide in one minute, that can be maintained on a continuous basis while using on each stroke the maximum usable energy as previously defined.

On intermittent operation, the press has to provide 80% of rated strokes per minute using the maximum energy on each stroke.

## 2.2 DEFINITIONS:

2.2.1 STRAIGHT SIDED PRESS: The term "straight side press" as used in this specification refers to mechanical presses of tie-rod construction comprised of a bed, a crown, and two uprights (columns). The uprights may in fact be designed with openings for moving bolster equipment or other purposes, but must still in effect comprise, with the other frame components, a rigid "box" structure.

2.2.2 SUSPENSION POINTS: Presses are also designated in terms of the number of suspension points. This is defined as the number of slide connections to the eccentric drive gears. For example, a two point press would normally have two eccentric strap connections to the slide. For double action presses, the number of suspension points is applicable to the ram.

2.2.3 FRONT TO BACK DRIVE: A front to back drive system is so arranged that the clutch/brake unit, eccentric gear shafts, etc., are designed so that their axis of rotation is aligned from front to back of the crown. Designs in which the axis of rotation run from left to right are not acceptable without prior Ford approval.

Transfer and progressive die presses do not require front to back drive.

2.2.4 DRIVE LINKAGE: Eccentric drive is preferred to crankshaft drive.

When a link drive system is specified, slow down (reduction in slide velocity versus eccentric) shall be as follows:

- a) Blanking Presses: 67% reduction at 12.5 mm (1/2") from bottom of stroke.



b) Other Presses: 50% reduction at 1/4 of the total slide stroke from bottom. (Inner slide only on double action presses.)

c) Other Slowdown Values: Require prior Ford approval.

2.2.5 BLANKING PRESS: A blanking press is a single action press as described in Section 2.2.6 but primarily used for cutting of blanks from sheet or coil.

2.2.6 SINGLE ACTION PRESS: A single action press has one mechanically driven slide, which may contain an integral pneumatic cushion unit, if specified. Pneumatic cushions may also be specified for installation in the press bed.

2.2.7 DOUBLE ACTION PRESS: A double action press has two slides, both mechanically driven by the same system. The slides are arranged to run one within the other, such that the inner slide, or ram, passes through the outer slide or blankholder. The inner slide should be driven, either directly or through a slow down link system if specified, by eccentric gears.

The outer slide is to be driven by a rocking link system to provide a dwell period at the bottom of its stroke.

The press may be provided with a pneumatic cushion in the bed if specified.

2.2.8 TRIPLE ACTION PRESS: A triple action press has three mechanically driven slides. The upper slides are arranged as for a double action press. The third action is in the form of an upstroking mechanical drive operating from the bed of the press, synchronized to run with the upper two slides when required. Third action is to be provided if requested and described in the specification.

2.2.9 SLIDING BOLSTER PRESS: A sliding bolster press is equipped with a system for rapid die change, which is comprised of one or two powered bolsters which can be moved along rails to a position outside the press. The system of operation, i.e. with movement through openings in both or one uprights, forward or backward between the uprights, and the position for parking during die change, will be detailed in the quotation. Construction of sliding bolster presses is described in a separate section of this standard.



## 2.3 STRUCTURE:

2.3.1 GENERAL: The structure forming the main frame of straightsided presses is to consist of four (4) basic units, comprised of one crown, two uprights, and one bed. The whole assembly is to be rigidly held together by four (4) pre-stressed tie rods.

Frame components, slides, and auxiliary structures are to be constructed as weldments from mild steel plate and sections. Each fabrication is to be fully stress relieved after welding and shot blasted before inspection for mark-out. Welds must be continuous for the full length of all joints. Flat abutments and welding shall be finished to present a clean and plane surface. Standards for the deposition of weld material and preparation for plate joints must not be inferior to those specified in the relevant National Standards.

Press components should be designed to make optimum use of the building and relevant overhead crane capacity. Each component is to be provided with facilities for the attachment of tackle for purpose of lifting, transporting, and moving by means of overhead crane, etc. The facilities shall be arranged to provide a balanced lifting condition without the use of special equipment or odd-legged slings. Lifting holes shall not be less than 60 mm (2 1/2") diameter.

Adjacent to each lifting point on the major frame components, the weight shall be metal stamped in characters at least 12 mm (1/2") high, stating the weight of the component in both stripped and assembled conditions. The press serial number and suitable orientation marks to assist in assembly shall be similarly stamped on metal on all frame components.

2.3.2 BED: If specified, the press bed is to be machined for installation of a pneumatic die cushion unit, which will be ordered with the press or at a later date for retro-fit. In this case, the press main drive shall be designed with an energy rating to include bed cushion operation. The bolster plate on presses not equipped with sliding bolster equipment is to be fixed by socket head screws to facilitate removal and permit dismantling of bed cushion unit through the bed opening.

The maximum deflection of the center of the bed must not exceed 0.125 mm per meter length of bed (or 0.0015 inches per foot) when subjected to the full press tonnage uniformly distributed over two-thirds of the specified left-to-right bed dimension.