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With the development of industry and the advancement of hydraulic technology, hydraulic presses are more and more widely used in industrial production. Whether you are a manufacturer or a user, it is important to understand how to calculate hydraulic press tonnage. As a professional hydraulic press factory, we will tell you how to calculate how much force a hydraulic press exerts and why it matters. The tonnage of the hydraulic press machine is the tonnage of the hydraulic cylinder. It refers to the output force of the hydraulic cylinder under the rated working pressure. The unit is KN, and one ton is equal to 10KN. To know the tonnage of the hydraulic cylinder, the first thing to know is the working pressure of the hydraulic system, the inner diameter of the hydraulic cylinder, and the outer diameter of the cylinder rod (needed when calculating the pulling force of the hydraulic cylinder). 5000T Hot Forging Press The thrust of the hydraulic cylinder (that is, the force that the hydraulic cylinder can produce) = the internal cross-sectional area of the hydraulic cylinder (or the cross-sectional area of the piston) working pressure The cross-sectional area of the cylinder (the cross-sectional area of the piston) = π \* d²/4 = (3.14) the square of the cross-sectional area of the piston 4 Working pressure: equal to the pressure displayed on the pressure gauge during the maximum load operation

For example: If hydraulic cylinder inner diameter = 10cm, working pressure = 16MPa (160kgf/cm²). First, calculate the cross-sectional area of the cylinder: Cross-sectional area of hydraulic cylinder = 3.1410104 = 78.5 cm² Then calculate the thrust: Thrust = 78.5 x 160 = 12560kg = 12.56 tons Through the hydraulic press tonnage calculation formula, we can easily calculate the tonnage we want to buy or need. Avoid buying low-tonnage equipment at high prices! At the same time, we can also calculate the working pressure of our own equipment through this formula, so as to avoid the overload operation of the equipment and improve the service life and performance of the hydraulic press. The Hydraulic Cylinder Tonnage Calculator is designed to calculate the force exerted by a hydraulic cylinder, a critical aspect in designing and assessing hydraulic systems. This calculator is particularly beneficial for engineers and technicians who need to ensure that their systems can achieve the required force for lifting, pressing, or moving loads. By inputting the cylinder's piston diameter and the system's pressure rating, the calculator provides an accurate estimation of the cylinder's output force in tons. The calculation of hydraulic cylinder tonnage relies on a straightforward yet fundamental formula: See also Lbs to Gallons Jet Fuel Calculator Online Tonnage = (Pi \* D / 4) \* P / 2000 Where: Tonnage is the force exerted by the cylinder in tons. Pi (π) is a mathematical constant approximately equal to 3.14159. D is the diameter of the cylinder's piston in inches. P is the pressure rating of the hydraulic system in pounds per square inch (psi). 2000 is the conversion factor from pounds to tons (1 ton = 2000 pounds). This formula is pivotal for calculating the exact force that a hydraulic cylinder can apply, making it indispensable in the design and evaluation of hydraulic systems. To aid in understanding and using the hydraulic cylinder tonnage calculator, here's a table of common terms and their definitions: See also Split AC Tonnage Calculator Online Term: Definition Tonnage: The force exerted by the hydraulic cylinder, measured in tons. Pi (π): A mathematical constant, approximately equal to 3.14159. Diameter (D): The diameter of the cylinder's piston, measured in inches. Pressure (P): The pressure rating of the hydraulic system, measured in pounds per square inch (psi). Conversion Factor: The number used to convert pounds to tons, with 1 ton equaling 2000 pounds. To illustrate the practical application of the formula, consider a hydraulic cylinder with a piston diameter of 4 inches, operating under a system pressure of 3000 psi. Using the formula provided: Tonnage = (3.14159 \* 4 / 4) \* 3000 / 2000 = 18.85 tons This example demonstrates how the calculator can be utilized to determine that the hydraulic cylinder in question can exert a force of approximately 18.85 tons, underlining the tool's utility in planning and assessing hydraulic systems. See also CFM Per Ton Calculator What is the importance of knowing a hydraulic cylinder's tonnage? Understanding a hydraulic cylinder's tonnage is crucial for ensuring that the hydraulic system is capable of performing its intended tasks, such as lifting heavy loads or applying the necessary force in industrial processes. Can I use this calculator for any cylinder size? Yes, the Hydraulic Cylinder Tonnage Calculator is versatile and can be used for any cylinder size, provided you know the piston diameter and the system's pressure rating. How accurate is the Hydraulic Cylinder Tonnage Calculator? The calculator's accuracy depends on the precision of the input values. Accurate measurements of piston diameter and system pressure will yield precise calculations of the cylinder's tonnage. Tech Team Kintek Solution Updated 4 months ago To calculate the hydraulic tonnage of a press, you need to understand the relationship between the hydraulic system's pressure, the area of the piston, and the resulting force. The tonnage is essentially the maximum force the press can exert, measured in tons. This calculation is critical for determining whether a press is suitable for a specific task, such as metal forming or stamping. By knowing the hydraulic pressure and the piston area, you can accurately determine the press's tonnage capacity. Key Points Explained: Understanding Hydraulic Press Tonnage: Hydraulic press tonnage refers to the maximum force the press can exert, measured in tons. This rating is crucial for selecting the right press for specific applications, such as metalworking or molding. The tonnage is determined by the hydraulic system's pressure and the piston's effective area. Basic Formula for Calculating Hydraulic Tonnage: The formula to calculate hydraulic tonnage is: Tonnage = (Pressure (psi) \* Piston Area (in²)) / 2000 Pressure: The hydraulic system's operating pressure, measured in pounds per square inch (psi). Piston Area: The effective area of the piston, calculated using the formula for the area of a circle: Area = π \* (Radius)² / 2. Tonnage: The result of the calculation, representing the maximum force the press can exert. Example Calculation: 2000 psi pressure, 5-inch piston diameter = 19.63 tons. Practical Tips: Add safety margins, ensure system compatibility, and verify application needs. Need help selecting the right hydraulic press for your needs? Contact our experts today! General - When pressure per square inch is known: psi x area of work / 2000 = 2 tons of ram force required Example: Where it is known that 1000 psi is needed to do a job on a 5" x 8" wide piece, 100 x 5" x 8" / 2000 = 2 tons Press Fit - To determine the force required to press fit two round pieces together such as a shaft pressed into a bushing, use the following formula: F = D x L x I x P/2 Where: F = force required in tons D = diameter of the part to be pressed in inches L = length of part to be pressed in inches (Note: the length of the interference fit only.) I = interference in inches (usually .002" to .006") P = pressure factor (See table below). Diameter (inches) Pressure Factor Diameter (inches) Pressure Factor Diameter (inches) Pressure Factor Diameter (inches) Pressure Factor 15003156591764 13953143586761 13253132582759 12763123578757 22404115675855 22124108672 21894101669 2171496666 Example: A steel shaft 2" in diameter pressed into a hole 3" long. The interference fit between the two diameters is .006". 2" x 3.14 x 3" x .006" x (200) = 13.56 tons Punching - A quick guide to determine tonnage requirements for punching steel is: Diameter x thickness x 80 = tons (where 80 is constant for steel. Use 65 for brass.) Example: A 3" hole in 250" stock 3" x 250" x 80 = 60 tons For noncircular holes, instead of the diameter, use 1/3 of the total length of cut. Example: A rectangular hole 4" x 6" in 250" stock: (4" + 6" + 4" + 6"/3) x 250" x 80 = 133.3 tons Deep Drawing - Deep-drawing calculations can be complex. The press, dies, material, radius, and part shape all have bearing. For drawing round shells, the following formula is a simple guide: C x T x Ts = tons Where: C = circumference of the finished part; T = material thickness in inches; and Ts = tensile strength of the material. Example: To draw a 5" diameter cup of .040" stock with a tensile strength of 46,000 psi would require the following tonnage: (5 x 3.1416) x .040 x (46000/2000) = 14.44 tons A 20-ton press would be recommended Straightening - The pressure required to straighten a piece of metal depends on its shape. Below is an approximate formula with a further definition for different shapes. Where F is the ram force in tons; 6 is a constant; L is ultimate strength of the material in psi; Z is the section modulus (see below); and L is the distance between the straightening blocks in inches. Example: A 2" diameter shaft, 18" between the blocks, 100,000 psi ultimate strength. How to determine strokes per minute for a hydraulic press The number of strokes per minute for a hydraulic press is determined by calculating a separate time for each phase of the ram stroke. The rapid advance time is calculated, then the pressing time (the work stroke); then, if there is no dwell time, the rapid return. The basic formula for determining the length of time in seconds for each phase of the stroke: Example: a hydraulic press with a 600 IPM rapid advance, 60 IPM pressing speed, and 600 IPM rapid return. The work requires a 3" advance, 1" work stroke, and 4" rapid return. 60 x 2.199 = 27 cycles per minute. Press tonnage refers to the highest amount of force that a press exerts during a stamping operation. It is an important metric to understand to ensure that a stamping operation is completed successfully and safely. In this article, we look at what press tonnage is, why it is important, how it is calculated, and the factors that affect it. What Is Press Tonnage? Press tonnage is the highest amount of force that a press exerts during a stamping operation. It is an important metric for manufacturers to understand, as it is used to determine the tonnage required for an operation and ensure that it is below the maximum tonnage rating of the stamping press. Two concepts that are closely related to press tonnage are reverse tonnage and snap-through. Snap-through refers to the quick acceleration of the press once it cuts through the material. This results in vibrations which may cause damage to the press. Reverse tonnage refers to the strain limitations of the connections between components in the press. What Is the Importance of Performing a Press Tonnage Test? A press tonnage test is performed to verify the tonnage required to perform a certain operation. It is very important, as too much tonnage can cause damage to the press, while too little tonnage can lead to low-quality parts. As part of the press tonnage test, the speed of the stroke can also be adjusted to ensure that snap-through and reverse tonnage are at manageable levels. How Is Press Tonnage Used in the Stamping Process or for an Alternative Service? Press tonnage is used in the stamping process in several ways as described below. Press Capacity: The press tonnage capacity is the maximum press tonnage that a press can handle before being damaged. Required Press Tonnage: Required press tonnage is the amount of tonnage required to perform a stamping operation. Press Tonnage Curve: The press tonnage curve shows how the tonnage of a press is applied across the entire stroke of the press. Typically, the tonnage will not be as high as the press tonnage capacity at all points of the curve. For example, with mechanical presses, the tonnage is at its highest at the very top and very bottom of the stroke. Understanding these press-tonnage-related metrics allows manufacturers to produce high-quality stamped parts safely and effectively. What Factors Affect the Press Tonnage for the Stamping Process? The press tonnage for stamping press operations is affected by the following: Material Thickness: Thicker materials require higher press tonnages to process. Material Properties: The tensile strength and shear strength of the material play a big role in the press tonnage required for a specific operation. Geometry of Operation: Complex geometries and geometries with longer perimeters will require higher press tonnages than simpler, shorter geometries. Type of Operation: Each type of operation (blanking, punching, deep drawing, bending, etc.) has its formula for calculating the required press tonnage. Is It Important To Determine the Press Tonnage for a Stamping Process? It is very important to determine the press tonnage of a stamping process. The required tonnage of a specific operation needs to be understood to ensure it does not exceed the tonnage capacity of the press. Doing so can result in damage to the press as well as potential safety hazards. How To Calculate the Press Tonnage of a Material? The required press tonnage of a material depends on many factors, including the type of operation, material tensile strength, material thickness, and material shear strength. For example, for punching a square hole, the following formula is used: Tonnage = P \* T \* S9.81 Where: P = Total length of the hole being cut in mm T = Thickness of the material in mm S = Shear strength of the material in kN/mm² What Are the Different Types of Press Tonnage? Different types of presses have different press tonnage capacities and ways of calculating press tonnage. Below is a list of some of these presses, and how their tonnage is calculated. 1. Hydraulic Press Tonnage Hydraulic presses use hydraulic cylinders to produce force on the material. They can deliver full tonnage over the entire stroke, whereas mechanical presses cannot. This is useful for applications such as deep drawing. Another example is that servo valves can deliver maximum force regardless of speed. This allows operators to slow down the stroke speed, which can reduce snap-through and reverse tonnage, increasing the longevity of the press. These characteristics should be considered when selecting a press to do a specific operation. To learn more, see our full guide on Stamping Press Types. What Are the Applications of Press Tonnage? Press tonnage is important in a range of applications and metal-forming processes, such as: Automotive: The automotive sector uses components that are stamped, including: deep-drawn, punched, and sheared components. The ability to apply the correct tonnage is important to ensure that these parts are manufactured accurately. Aerospace Components: Metal aerospace components often go through a stamping process. Knowing the correct press tonnage ensures these components are of high quality and dimensionally accurate. Medical Devices: Medical device components and enclosures may undergo punching, blanking, and deep drawing. Press tonnage assessment is used to ensure that the delicate components can be properly processed without being damaged or broken. Consumer Appliances: Consumer appliances are commonly made using stamped components. Press capacity is an important metric to help ensure that any deep-drawing, cutting, or punching operations are successfully applied. What Are the Factors That Can Affect the Press Tonnage of a Material? Several factors affect the press tonnage of a material, including: Thickness of the Material: Thicker materials have higher required press tonnages. Type of Operation: Certain operations, such as cutting, require higher press tonnages. Tensile Strength of the Material: Higher tensile strengths require higher press tonnages. Friction Between the Die and the Material: Lower frictions lead to lower required press tonnages. The design of the die, or the presence of lubrication can lower the friction between the die and material. What Are Different Types of Press Tonnage Failure? The following list explains several different types of failure due to press tonnage. 1. Safety Hazards Safety hazards refer to the risk of injuries due to the malfunctioning of the press. This can include components of the press or tooling breaking violently, which can pose a danger to press operators. 2. Overloading/Overloading refers to applying force beyond the press capacity. This leads to damage to the press or tooling. An example of the types of failures caused by overloading would be the deformation of the frame of the press. 3. Material Failure Materials failure is when the material being processed fails due to the forces applied. Possible failures include: splitting due to excessive thinning, edge cracks, or bending failures. 4. Underloading/Underloading refers to situations in which the force applied by the press is insufficient for the operation. This can lead to inadequate processing of the material, including inaccurate bends, or incomplete cuts. 5. Imbalanced Loading Imbalanced loading is when the force exerted on the material is distributed unevenly. This can lead to uneven wear on tooling, damage to press components, or poor quality of the final product. 6. Tooling Failure Tooling failure refers to the tooling malfunctioning or suffering damage, rather than the press itself. This may be due to poor maintenance, defects, or the tonnage of the operation exceeding the toolings rated tonnage. How Does Material Thickness Impact the Required Press Tonnage in a Stamping Process? The material thickness has a significant impact on the required press tonnage in a stamping process. Thicker materials require higher force for all press operations, which leads to higher press tonnage requirements. The press must be capable of applying enough force to process the required thickness of the material. Using a press with insufficient tonnage capacity can lead to press failures including: damage to the press, safety hazards, and inadequate material processing. What Role Does Die Design Play in Determining the Appropriate Press Tonnage? Die design plays a substantial role in determining the appropriate press tonnage. The geometry and size of the die, as well as the intended operation, will affect the press tonnage significantly. In general, smaller, simpler geometries will result in lower required press tonnages. This is because the smaller footprint causes less friction between the die and the workpiece. XTJ is a leading OEM Manufacturer that is dedicated to providing one-stop manufacturing solutions from prototype to production. We are proud to be an ISO 9001 certified system quality management company and we are determined to create value in every customer relationship. We do that through collaboration, innovation, process improvements, and exceptional workmanship. Posted in CNC Materials, Industrial News, News Tagged Press, Press Tonnage In my experience working with hydraulic presses, calculating the tonnage required for specific applications is essential for ensuring proper operation and achieving desired results. Understanding how to calculate hydraulic press tonnage helps operators select the right machine for their needs and avoid potential equipment failures. Over the years, I have developed a clear method for this calculation, taking into account factors such as material properties, stroke length, and the type of operation being performed. In this article, I will guide you through the process of calculating hydraulic press tonnage, providing practical tips and formulas to enhance your pressing operations and efficiency. Understanding the hydraulic press tonnage capacity of a hydraulic press is crucial for ensuring optimal performance and safety. Hydraulic presses are essential tools in various industries, from manufacturing to automotive, used for tasks ranging from molding to metal forming. In the realm of manufacturing and industrial operations, the hydraulic press stands as a cornerstone of efficiency and power. With its ability to exert immense force through the application of hydraulic pressure, this machine plays a crucial role in various processes, from metal forming to plastic molding and beyond. At the heart of understanding and maximizing the capabilities of a hydraulic press lies the concept of tonnage calculation. In this comprehensive guide, we delve into the intricacies of calculating tonnage in hydraulic presses, exploring the fundamental principles, mathematical formulas, and practical considerations that underpin this essential aspect of press operation. Tonnage, in the context of hydraulic presses, refers to the amount of force exerted by the press ram onto the workpiece. It determines the capacity of the press to deform or shape the material being processed. Tonnage is a critical parameter that influences the success and efficiency of manufacturing operations. In hydraulic presses, tonnage is typically measured in tons (metric tonnage), where one ton equals 2,000 pounds of force. However, it's important to note that tonnage does not necessarily equate to the weight of the material being pressed; rather, it signifies the force required to achieve the desired deformation or compression. The type and thickness of the material being worked on significantly influence the required tonnage. Thicker or harder materials require higher tonnage to achieve the desired deformation or shaping. Different materials exhibit varying degrees of resistance to deformation. Metals, for instance, typically require higher tonnage compared to plastics or rubber. Additionally, the thickness of the material directly impacts the amount of force needed for shaping or forming. The design and geometry of the die or tooling used in the hydraulic press also play a crucial role. Complex shapes or intricate patterns may require higher tonnage to form accurately. Friction between the material and the die surfaces introduces additional resistance, thereby increasing the required tonnage. Higher friction requires increased tonnage to overcome resistance and achieve proper deformation. Proper lubrication and die maintenance can help mitigate frictional losses. The nature of the manufacturing process being performed on the hydraulic press affects tonnage requirements. For instance, deep drawing operations typically demand higher tonnage compared to simple bending or punching operations. Different types of hydraulic presses (e.g., C-frame, H-frame, four-post) have varying tonnage capabilities and structural limitations. The press configuration must be matched to the applications tonnage requirements. Factors like temperature, speed of operation, and environmental conditions can influence tonnage requirements. These factors should be considered to ensure accurate calculations. 7. Workpiece Support Adequate support for the workpiece during pressing helps distribute force evenly and prevents deformation issues. Improper support can lead to tonnage miscalculations and safety hazards. The formula for calculating tonnage in a hydraulic press is relatively straightforward, involving the area of the workpiece and the desired pressure. Where: Tonnage is the force exerted by the hydraulic press in tons. Pressure is the desired pressure applied to the material in pounds per square inch (psi). Area is the total contact area between the material and the die surface in square inches. Case Study: Deep Drawing Process Lets illustrate the tonnage calculation process with an example of a deep drawing operation, where a cylindrical cup is formed from a sheet metal blank. Given Parameters: Material: Steel Material Thickness: 3 mm Blank Diameter: 150 mm Material Strength (Steel): 400 MPa Factor of Safety: 1.5 Step 1: Determine Material Strength The ultimate tensile strength of steel is 400 MPa. Step 2: Measure Material Thickness The thickness of the steel sheet is 3 mm. Step 3: Calculate Blank Area Step 4: Select Factor of Safety A factor of safety of 1.5 is chosen for this operation. Step 5: Apply the Tonnage Formula In this example, the calculated tonnage required for the deep drawing operation is approximately 14,136 tons. 1. Determine the Pressure: The required pressure depends on factors such as material properties, desired deformation, and die design. It is typically specified by engineers based on the project requirements. 2. Calculate the Area: The contact area between the material and the die surface is crucial for accurate tonnage calculation. For simple shapes like rectangles or circles, the area can be calculated using basic geometry formulas. For complex shapes, advanced techniques such as finite element analysis (FEA) may be necessary to determine the contact area accurately. 3. Apply the Formula: Once the pressure and area are determined, plug the values into the tonnage formula to calculate the required force exerted by the hydraulic press. 4. Consider Safety Margin: It's essential to include a safety margin when calculating tonnage to account for variations in material properties, friction, and other factors. A safety margin of 20-30% is commonly recommended to ensure reliable performance and prevent overloading of the press. It's crucial to select the appropriate tonnage for your application to avoid damaging the press or the workpiece. Choosing too low tonnage may result in incomplete or uneven deformation. Selecting too high tonnage can lead to excessive wear on the press and increased energy consumption. Calculating tonnage in a hydraulic press is essential for determining the required force to deform or shape materials effectively. By understanding the factors influencing tonnage and following the proper calculation procedures, manufacturers can ensure optimal performance and safety in various industrial applications. Mastering the art of calculating tonnage in hydraulic presses is essential for optimizing manufacturing processes, ensuring product quality, and maximizing operational efficiency. By understanding the fundamental principles, factors, and formulas involved, manufacturers can accurately determine the tonnage requirements for various press operations, thereby achieving desired outcomes with precision and reliability. Whether it's metal forming, plastic molding, or any other application, the ability to calculate tonnage empowers industrial practitioners to unleash the full potential of hydraulic press technology. Machine press using a hydraulic cylinder to generate a compressive force Hydraulic press is a machine press using a hydraulic cylinder to generate a compressive force. [1] It uses the hydraulic equivalent of a mechanical lever, and was also known as a Bramah press after the inventor, Joseph Bramah, of England. [2] He invented and was issued a patent on this press in 1795. As Bramah (who is also known for his development of the flush toilet) installed toilets, he studied the existing literature on the motion of fluids and put this knowledge into the development of the press. [3] The hydraulic press depends on Pascal's principle. The pressure throughout a closed system is constant. One part of the system is a piston acting as a pump, with a modest mechanical force acting on a small cross-sectional area; the other part is a piston with a larger area which generates a correspondingly large mechanical force. Only small-diameter tubing (which more easily resists pressure) is needed if the pump is separated from the press cylinder. Hydraulic presses are commonly used for assembly and disassembly of tightly-fitting components. In manufacturing, they are used for forging, clinching, molding, blanking, punching, deep drawing, and metal forming operations. Hydraulic presses are also used for stretch forming, rubber pad forming, and powder compacting. [4][5] The hydraulic press is advantageous in manufacturing, as it gives the ability to create more intricate shapes than other methods and can be economical with materials. [6] A hydraulic press will take up less space compared to a mechanical press of the same capability. [7] In geology a tungsten carbide coated hydraulic press is used in the rock crushing stage of preparing samples for geochemical analysis in topics such as understanding the origins of volcanism. [8] 440-ton compression hydraulic molding press The room featured in Fermat's Room has a design similar to that of a hydraulic press. [9] Boris Artzybasheff also created a drawing of a hydraulic press, in which the press was created out of the shape of a robot. In 2015, the Hydraulic Press Channel, a YouTube channel dedicated to crushing objects with a hydraulic press, was created by Lauri Vuohensilta, a factory owner from Tampere, Finland. [10] The Hydraulic Press Channel has since grown to over 9 million subscribers on YouTube. There are numerous other YouTube channels that publish videos involving hydraulic presses that are tasked with crushing many different items, such as bowling balls, soda cans, plastic toys, and metal tools. A hydraulic press features prominently in the Sherlock Holmes story "The Adventure of the Engineer's Thumb". Universal testing machine "What is a Hydraulic Press?". XRF. 2018-02-08. Archived from the original on 2019-10-11. 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You typically measure hydraulic pressure in pounds per square inch (psi), which is force per unit area. To calculate the force produced, multiply the pressure by the area of the hydraulic cylinder's piston in square inches. This will give you the force in pounds, which you can easily convert into tons. To calculate hydraulic press force, first find piston area from piston diameter. Then multiply the pressure in psi by cylinder area in inches. Divide force in pounds by 2,000 to get force in tons. Reference the necessary data, such as psi and cylinder piston diameter or area. Look for this information in the hydraulic press's specification sheet. Calculate the area of the cylinder piston, if you can't find it on the specification sheet. Use the formula: Area equals 3.14 times the square of the diameter, divided by four. As an example, if the piston diameter is 4 inches, then you would multiply 3.14 times 4 inches times 4 inches, divided by 4. Therefore, the area is 12.56 square inches. Multiply the pressure rating, in psi, by the area. In the example, if the press offered 2,500 psi, then you would multiply 2,500 by 12.56. This gives you 31,400 pounds. Divide the number of pounds by 2,000 to convert to tons. In the example, 31,400 divided by 2,000 gives you a force of 15.7 standard tons. If you wish to convert to metric tons, you would divide by 2,205. In the example, 31,400 divided by 2,205 gives you a force of 14.24 metric tons. Georgia State University: Pascal's Principle Taylor, C., "How To Calculate Hydraulic Press Force In Tons", sciencing.com, , 10 May 2018. APA Taylor, C., (2018, May 10). How To Calculate Hydraulic Press Force In Tons. sciencing.com. Retrieved from Chicago Taylor, C., How To Calculate Hydraulic Press Force In Tons last modified March 24, 2022. Share copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation. No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. The force that the press is designed to exert against the work piece in the die. The tonnage rating is specified at a distance above the bottom of the stroke of the slide, which is the rated capacity of the machine. In most cases, mechanical non-g geared presses of less than 45 tons capacity are rated at 1/32" (most commonly) to 1/16" (less frequently) from BDC. Geared presses of 45 tons and lesser capacity, if properly designed, should generally deliver full rated tonnage at 1/16" to 3/16" from BDC.Note: Wintriss SmartPAC systems equipped with the Advanced WaveFormPAC load monitor can help you determine if your work is within the rated capacity of the machine. WaveFormPAC provides a comparison of actual tonnage waveform to press capacity curve (user to input up to 15 values corresponding to press capacity at various distances off bottom as provided by the manufacturer).EnergyWhile work is being done on the work piece in the die, energy is required from the press. The flywheel of the press is a rotating body in which kinetic energy is accumulated and stored as it rotates during the non-working portion of each press stroke. The flywheel receives energy from the press motor. While work is being done during the working portion of a press stroke, the flywheel slows as it releases energy to do the work of metal forming in the die. This energy must be restored to the flywheel by the motor during the longer non-working portion of the press cycle.Note: Watriss WaveFormPAC will also monitor motor slow down.Measurement Units & EquivalentsMicrons1 micron = 1 millimeter divided by 1000 = .00004" 10 microns = .0004", etc.Press Stroke/Shut HeightShut height changes at a rate = 1/2 the stroke changeExample:4" stroke, 12" shut height change to 6" stroke, shut height become 11"Milliseconds1 millisecond = 1 second divided by 1000Example:Related to a press running at 250 strokes per minute250 SPM divided by 60 (seconds) = 4.166 strokes per second,1 divided by 4.166 = .240 (1 stroke in 240 milliseconds)240 divided by 360 degrees = .666;therefore, the crank strokes. 66 degrees per millisecond.Metric Ton Slide VelocityStroke x pi x SPM divided by 12 = slide velocity at mid-stroke in feet per minute Example:4" stroke x 3,1416 x 60 divided by 12 = 62 feet per minute.This is about the maximum speed you can draw mild steel.Realize the slide velocity drops off considerably as you near bottom of the stroke.Same example: 54 FPM at 1", 48 FPM at 3/4", 42" at 1/2" and 30 FPM at 1/4".Note: WaveFormPAC also measures/displays slide speedKilonewton Millimeters / InchesMultiply by .03937 (mm to in.)Divide by 25.4 (in. to mm)Kg/cm2 to PSI KW to HP Kilograms to Pounds Press CalculationsBlanking TonnageDTC x T x 25 (for mild steel)Blank Diameter x t x Thickness x 25Example: 6" dia. blank x .125 thick x 6 x 3,1416 x .125 x 25 = 59 tonsSafety DistanceSafety distance is the distance required for various types of presence sensing devices (most commonly, light curtains) or two hand controls to be effective. Safety distance defines the location the device must be located from the hazard such that hazardous motion is prevented, completed or stopped before the individual can reach the hazard. Refer to OSHA 1910.217, ANSI B11.1-2009, and/or ANSI B11.19 for more details.OSHA Safety Distance CalculationThe OSHA safety distance formula as specified in OSHA 1910.217 isDs = K x TswhereDs is the OSHA safety distance in inchesK is the OSHA-recommended hand-speed constant of 63 inches-per-secondTs is the stopping time of the press in seconds measured at 90 degree position of the crankshaft.ANSI Safety Distance CalculationANSI formulas are more demanding and consider control response time, device response time, object sensitivity, and awake monitor safety factors.The formula isDs = (Tc + Tr + Tspm) + DpwhereDs is the OSHA safety distance in inchesK is the OSHA recommended hand-speed constant of 63 inches-per-secondTs is the stopping time of the press in seconds measured at 90 degree position of the crankshaft.Tc is the clutch/brake control response time which may be included and displayed by some controls with integral stop time measurement capability.Tr is the reaction time of the safety device.Tspm is the allowed brake decay time established by the brake performance monitor.Dp is the depth of penetration allowed by the object sensitivity of the presence sensing device. This is usually provided by the manufacturer Download a PDF version

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