SAE International

SURFACE VEHICLE STANDARD

SAE J1479 NOV2012

Issued 1985-01
Stabilized 2012-11

Superseding J1479 SEP1999

Automotive Pull-Type Clutch Terminology

RATIONALE

Document is current and appears unlikely to be in need of revision in the foreseeable future.

STABILIZED NOTICE

This document has been declared "Stabilized" by the SAE Truck and Bus Advanced and Hybrid Powertrain Steering Committee and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: http://www.sae.org

Foreword—This revision is intended to update the document with current terms added to common usage since the original issue of this document.

TABLE OF CONTENTS

1. Scope—This SAE Standard describes the terms or names of the parts, characteristics, and parameters of automotive pull-type clutches used in trucks, and of vehicle apparatus or components related to the pull-type clutch.

1.1 Purpose—This document defines commonly used truck and bus clutch technical terms which may be found in industry publications. The purpose is to promote commonization of these terms for a clearer understanding of the technical content of industry publications.

2. References

2.1 Related Publications—The following publication is provided for information purposes only and is not a required part of this document.

The following publication defines specialized conditions and terminology concerning driveline resonance vibrations:

2.1.1 TMC PUBLICATION—Available from The Maintenance Council, American Trucking Associations, 2200 Mill Road, Alexandria, VA 22314.

TMC RP 633 (T) Effects of Drivetrain Torsionals

3. *Definitions*

3.1 Adapter Ring—Often referred to as an intermediate ring. Normally used with two plate clutches that are used with flat type engine flywheels to drive the intermediate plate.

3.2 Adjusting Ring—A threaded ring inside the pressure plate assembly used to move the internal parts of the cover assembly and release bearing to compensate for wear of clutch facings.

3.3 Bolt Circle—The nominal diameter of the bolt circle in the engine flywheel for the clutch cover mounting bolts to the engine flywheel.

3.4 Bolt Piloted Cover Assembly—This is a pressure plate assembly that requires special body fit bolts to mount and position it to the flywheel. This body bolt fits snugly into the clutch cover mounting holes and enters specially machined counterbores in the engine flywheel.

3.5 Brake Height—Distance from the flywheel friction surface to the rear face of the release bearing assembly for pull-type clutches when installed on a flywheel and clamped over nominal thickness clutch discs. The term is normally used for manufacturing purposes.

3.6 Brake-Torque Limiting—A clutch brake that limits amount of torque applied to the input shaft.

3.7 Burst Strength—The maximum rotational speed a clutch can sustain without breaking apart.

3.8 Clutch Brake—A disc brake type device splined to the transmission input shaft and located between the rear of the clutch release bearing housing and the transmission front bearing cap. Used to stop the transmission input shaft to facilitate initial gear engagement of the transmission into first and reverse. Also known as input shaft brake.

3.9 Clutch Brake Squeeze—The movement of the clutch pedal at the lowest part of its travel during which the clutch brake is engaged and squeezed for actuation. This must take place before the pedal bottoms out in the cab.

3.10 Clutch Cover—The cast or stamped metal clutch outer housing that usually attaches directly to the engine flywheel or adapter ring. The pressure plate and other components are added to it to make the pressure plate assembly.

3.11 Clutch Drag—A noticeable level of engine torque transferred to the transmission when the clutch is fully disengaged. Note that it can be caused by transmission input shaft pilot bearing drag, side loading of the release bearing, incorrect clutch adjustment or internal clutch deficiencies. Side loading of the release bearing can be caused by poor release yoke geometry (due to incorrect release bearing position) or incorrect yoke/cross shaft/external lever assembled length.

3.12 Clutch Engagement—The act of allowing the clutch pedal to start upward from a fully depressed position at vehicle startup or after shifting transmission gears. Initially, the engine flywheel and the clutch disc can be at greatly different rotational speeds. The upward pedal movement causes the plate load of the clutch to push the pressure plate against the clutch facings. As the pedal continues upward, an increasing amount of the plate load is allowed to squeeze the clutch facings against the engine flywheel eventually causing the clutch disc and the engine flywheel to turn at the same speed.

3.13 Clutch Engagement Torque—The maximum amount of engine torque generated during clutch engagement. This is meant to pertain only to engagements made from a standing start when the engine is normally allowed to operate only at idle speed.

3.14 Clutch Facings—The wearable lining material attached to the outer annular surfaces of the driven discs. They are designed for momentary slippage during clutch engagement and they provide a level of friction for the transfer of engine torque to the transmission. The facings are sacrificial elements which wear away with use. They are usually made in two types:

3.14.1 CERAMETALLIC FACINGS—Also known as ceramic facings. These facings are made of a sintered metal compound usually consisting of copper and ceramic powders. They have a relatively high coefficient of friction, need to be engaged at low engine speed and can give abrupt (harsh) clutch engagement. They are usually produced in small pad or button shapes with 3 to 10 attached on each side of the disc.

3.14.2 ORGANIC FACINGS—Made of resin-bound woven organic material. They are usually made as one continuous annular ring attached one per each side of the driven disc. They have about one half of the friction coefficient of cerametallic facings, can be engaged at higher engine speed and often give smoother clutch engagement.

3.15 Clutch Housing—Usually bolts between the engine flywheel housing and the transmission case. This housing encloses the clutch assembly and usually supports the cross shaft and release yoke or fork. Generally it has an opening in the bottom for adjusting the clutch. The opening is usually covered by a sheet metal cover at a joining surface that is not water tight. This housing is normally supplied as part of the transmission and may include provisions for the rear engine mount, often referred to as nodal mounts. In some instances, it may be an integral part of the transmission case. It is sometimes called the bell housing.

3.16 Clutch Lever Ratio—The ratio of the pressure plate assembly's clutch release bearing travel divided by plate departure. It establishes the release bearing load once the plate load requirements are known.

3.17 Clutch Pedal Stroke—The full movement of the clutch pedal including free pedal travel, release pedal travel and clutch brake squeeze (where applicable).

3.18 Clutch Torque—This is the maximum torque carrying capacity of a clutch, either calculated or determined by test. The recommended torque is based on this value. Also known as torque capacity.

3.19 Coaxial Springs—Two springs which are mounted on a common axis with one fitting inside the other. They are commonly used in driven disc torsional dampers to obtain a higher spring rate and load capacity in a given space.

3.20 Cross Shaft—Also called release shaft. One or two shafts supporting the release yoke. Single shaft referred to as a through shaft, double shafts referred to as a split shaft or halfshafts. They are inserted through clutch housing pivot bushings and into mating side holes in the release yoke. An external lever is mounted on one end of the shaft which extends outside the clutch housing. The vehicle's release linkage is attached to this external lever. They form the axis around which the yoke rotates during clutch pedal actuation.

3.21 Damped Clutch—A clutch assembly using driven disc(s) which contain torsional dampers.

3.22 Damper Disc Torque Capacity—This is the maximum engine torque that can be used with damped disc/discs. Total torque is usually listed for the combination of all damped discs in multi-plate clutches.

3.23 Disengaged—The condition where the clutch pedal is pushed down through the release pedal travel portion of the clutch pedal stroke and the clutch is no longer transferring engine torque to the transmission. Also known as released.

3.24 Drive Lugs—Projections or ears extending from the OD of the two plate clutch intermediate plate. These lugs are used to drive the intermediate plate and fit into openings of the cast clutch covers or adapter rings. Drive lugs are generally used on intermediate plates with flat type engine flywheels.

3.25 Drive Pins—A steel device used with pot type engine flywheels and a two plate clutch. They attach to the flywheel and are used to drive the clutch intermediate plate which has slots machined into its outer diameter.

3.26 Driven Disc—A disc splined to the transmission input shaft, and having clutch facings mounted on each side. It is used to transmit torque by a friction coupling created when the pressure plate load is used to squeeze the disc between the pressure plate and the flywheel (one-plate clutch) or between the pressure plate and intermediate plate and between the intermediate plate and flywheel (two-plate clutch). Three types are available as:

3.26.1 DAMPED DISC—Driven disc made using a torsional damper.

3.26.2 RIGID DISC—Driven disc with the hub mounted rigidly to the friction material support (no torsional damper), permitting no rotational movement between the disc hub and friction materials.

3.26.3 CUSHIONED DISC—Usually a spring steel compressible segmented backing for the friction material, designed to conform to irregularities of the mating surfaces and to reduce engagement aggressiveness. May be used on both damped and rigid discs.

3.27 Driven Disc Torsional Damper—A torsionally compliant driven disc usually consisting of tangentially oriented coil springs fit into openings in the disc's hub and between spring openings (windows) in the outer retainer plates. It was originally added to improve the smoothness of clutch engagements and to soften the transmission of shock loadings. Some dampers contain internal friction generating devices used to produce a "tuned" damper characteristic.

3.28 Engaged—The condition where the clutch pedal is in the fully up position and the clutch is transferring full engine torque to the transmission.

3.29 Engine Torque—The twisting force generated by the engine. Engine ratings usually include the gross peak engine torque available and the engine speed at which it occurs. This torsional load must be carried by the clutch assembly in transferring the engine's output to the vehicle's transmission.

3.30 Facing Wear—The amount of facing thickness lost due to clutch service operation. Clutch manufacturers specify maximum wear capacity for a clutch disc which is typically the amount of facing thickness above attaching rivets or above the bond level in unriveted facings.

3.31 Flywheel—A round metallic member, attached to the engine crankshaft, used to provide rotational inertia. It also usually has the engine starter ring gear attached at its outer diameter. It has a friction surface for the clutch driven disc and an attachment surface for the clutch pressure plate assembly which is bolted directly to it or through an adapter ring. It also supports the pilot bearing. Flywheels can be pot-type or flat-type depending on the types of clutches used with them.

3.32 Flywheel Housing—It surrounds the flywheel and serves as an adapter between the rear of the engine and the clutch housing. It also usually supports the engine starter motor. The clutch housing pilots into the flywheel housing for close concentricity and squareness. The flywheel housing is generally supplied as a part of the engine and may include provisions for the rear engine support.

3.33 Free Pedal Travel—Sometimes called free pedal or free travel. The amount of movement in the clutch pedal from its highest position to the point where the clutch begins to disengage. This corresponds to the release fork or yoke movement through the yoke gap from the engaged position to the point where it touches the release fork contact surface on the bearing housing.

3.34 Free Travel Damper—A design feature included in some driven disc torsional dampers intended to eliminate engine induced idle rattle noise. It consists of a limited degree of "free" torsional rotation of the damper where no torsional spring rate is used. Some driven disc designs use a "pre-damper" or "idle stage" in place of free travel. These designs use very soft rate springs and usually friction generating devices to produce a "tuned" idle damper characteristic concentric within the main damper unit.

3.35 Idle Rattle Noise—A rattle noise coming from the transmission gearing generated by engine firing pulses. It occurs when the engine is operated at idle speed, the transmission is in neutral and the clutch is engaged.

3.36 Intermediate Plate—Often referred to as a center plate, it is used in multi-driven disc clutches. It is driven by the clutch cover, engine flywheel, or adapter ring and is free to float axially. This plate is generally made of cast iron and provides friction surfaces for the driven discs that are in contact with the flywheel and the pressure plate. Its mass is used to absorb and dissipate the unwanted heat generated during clutch engagement.

3.37 Lever Drop—A reduction in clutch pressure plate lever height due to disc facing wear, or wear of clutch pressure plate internal linkage on a pull-type clutch.

3.38 Lever Height—The distance from the clutch pressure plate lever bearing contact surface to the flywheel. This is specified in the new position with a disc assembly of nominal thickness. For diaphragm spring pressure plates, it is most often known as finger height.

3.39 Pack Thickness—The total thickness of the driven discs and intermediate plate or plates. This value is of primary interest to the Aftermarket industry.

3.39.1 FREE PACK THICKNESS—Pack thickness measured with no compressing force applied.

3.39.2 PACK DISC THICKNESS—Pack thickness measured with pressure applied to compress disc cushions.

3.40 Pedal Effort—The force required to depress the clutch pedal during clutch disengagement. This is also shown by a curve plotting the pedal load versus clutch pedal depressed position. The amount of pedal effort experienced is greatly influenced by the vehicle's release linkage ratio and efficiency. The load due to clutch brake application is experienced after the clutch is disengaged.

3.41 Pilot Bearing—This bearing centers and supports the front end of the transmission input shaft and is normally pressed into the engine flywheel.

3.42 Plate Departure—(Plate Separation/Lift) The dimensional distance of pressure plate travel from the engaged to full disengaged position.

3.43 Plate Load—The amount of normal force the pressure plate exerts on the driven disc, when the clutch is fully engaged. Also known as clamped load or clamping force.

3.44 Pot Depth—The distance in the engine pot type flywheel from the flywheel friction surface to the clutch cover assembly mounting surface.

3.45 Powertrain—Also known as drivetrain. The vehicle's motive power system comprised of the engine, clutch, transmission, driveline, axle, and wheels/tires.

3.46 Pressure Plate—A metallic plate usually of gray cast iron which has a friction interface with the rearmost disc and is a major component in the pressure plate assembly. Its mass is used to absorb and dissipate the unwanted heat generated during clutch engagement. High speed gasoline engine clutches often use nodular cast iron for the pressure plate.

3.47 Pressure Plate Assembly—Contains the clutch cover, pressure plate, spring loading device, and other internal parts. It may include an adjusting ring and release bearing. It does not include the clutch brake, driven disc(s), intermediate plate, or adapter ring. Also known as the clutch cover assembly or pressure plate and cover assembly (PPCA).

3.48 Pressure Plate Lever—The actuating levers of a pressure plate assembly which are pushed or pulled (based on clutch type) to disengage the clutch. They rotate at engine speed and are contacted by the release bearing when the clutch pedal is depressed. On clutches with diaphragm springs, the levers are often an inner extension of the diaphragm itself.

3.49 Pressure Plate Parallelism—A measure of variation of pressure plate surface height to flywheel friction surface during clutch disengagement.

3.50 Pressure Plate and/or Intermediate Plate Drive Area—The amount of contact driving area between the pressure plate and cover, or intermediate plate and drive lugs or pins.

3.51 Pull-Type Clutch—A clutch having the release bearing attached to the pressure plate assembly. The release bearing is pulled rearward away from the engine flywheel to disengage the clutch. This type of clutch actuation allows the use of a release bearing actuated clutch brake.

3.52 Push-Type Clutch—A clutch which is disengaged by pushing the release bearing forward towards the engine flywheel. The release bearing is usually mounted on a part of the transmission. This type of clutch actuation is not used with release bearing actuated clutch brakes.

3.53 Recommended Torque—The maximum level of engine torque recommended to be used in an application with a given pressure plate assembly and driven disc pack. The engine torque used is that at peak torque speed, not the torque at the engine's rated speed (which is the peak power speed). Clutch manufacturers calculate this value by dividing the clutch torque rating by a safety factor. Also known as application torque.

3.54 Release Bearing—Sometimes referred to as a throw-out bearing. A ball bearing device which controls cover assembly disengagement and engagement when actuated by the release fork or yoke. It bridges the gap between the non-rotating clutch release system and the rotating clutch.

3.55 Release Bearing Anti-Rotation Surfaces—The flat portion of the release bearing housing sides designed to fit closely inside the flat inner surfaces of the release yoke/fork much like a bolt or nut fits inside an open end wrench. It prevents the release bearing housing from rotating with the engine.

3.56 Release Bearing Assembly—Also known as the release bearing carrier assembly. This includes the release bearing and the hub it is mounted on. It may also include additional components to attach to the levers or yokes.

3.57 Release Bearing Gap—This is the distance from the rear face of the release bearing rearward to the front face of the transmission front bearing cover, or to the front face of a clutch brake (if used) once the brake has been pushed fully rearward. For pull-type clutches, this gap must be at least equal to the clutch release travel in order to allow full clutch disengagement. For push-type clutches, this gap must be equal to the clutch wear capacity specification to allow full clutch engagement when the clutch is at its wear limit.

3.58 Release Bearing Housing—The outer housing of the release bearing assembly. Usually made of cast iron.

3.59 Release Bearing Load—The force required to hold the clutch release bearing in a given disengaged position. It can be shown as a curve giving the load from the engaged to the fully disengaged position. Clutch manufacturers often specify a maximum value required for a clutch model. Clutch actuation loads provide an intermittent load applied to the engine crankshaft thrust bearing.