Review of B11 Standards –  
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The three documents listed above consist of over 200 pages. A review of the Standards shows that they deal mostly with Machine Tool guarding. The series of standards are following the trend in industrial safety of placing the responsibility to do a risk assessment of the machine and then take steps to reduce the risk and exposure.

Standard ANSI B11.0-2010 Page 47 – 7.16 Mechanical Power Transmission is the section that directly affects the B77 Standard.

7.16 Mechanical power transmission

Mechanical power transmission apparatus shall be safeguarded by a guard, device or safe-location safeguarding method to prevent contact with hazardous machinery motion. See B11.19 for additional information on safeguarding.

Hazards associated with the operation of mechanical power transmission apparatus shall be eliminated by design of the equipment or safeguarded by a guard, device or safe location (as per 6.5.1.1). Where practicable, mechanical power transmission apparatus shall be located within the structure of the machine, equipment, or system.

Where breakage of a mechanical power transmission component can result in injury, provision shall be made for appropriate containment of components.

For bypassing requirements of mechanical power transmission apparatus, see 7.9.2.1.

Safeguarding may not be required for certain mechanical power transmission apparatus based on the results of a documented risk assessment.

Informative Note: Certain power transmission apparatus may lack sufficient energy to create a hazardous situation.

As you look at this wording, you should note that third paragraph of the B11.0, section 7.16 on breakage is the same as the second paragraph of B77.1-2011 – X.1.2.7.1

4.1.2.7 Location of machinery

4.1.2.7.1 General

Moving machine parts that normally may be in reach of personnel shall be fitted with guards. Where breakage of a power transmission component can result in injury, provisions shall be made for appropriate containment of said components. Guards and containment shall be done in conformance to American National Standard, ANSI/ASME, B15.1-2000 (R2008), Safety Standard for Mechanical Power Transmission Apparatus.
B11 Definitions of Interest

The B11 standards have a uniform set of definitions that are used across the standards. As the standards were reviewed, the following list of definitions of interest was compiled. PC11-29 has several definitions cited which are included in the following list:

acceptable risk: A risk level achieved after risk reduction measures have been applied. It is a risk level that is accepted for a given task (hazardous situation) or hazard. For the purpose of this standard, the terms -acceptable risk” and -tolerable risk” are considered to be synonymous.

Informative Note 1: The expression acceptable risk” usually, but not always, refers to the level at which further technologically, functionally and financially feasible risk reduction measures or additional expenditure of resources will not result in significant reduction in risk. The decision to accept (tolerate) a risk is influenced by many factors including the culture, technological and economic feasibility of installing additional risk reduction measures, the degree of protection achieved through the use of additional risk reduction measures, and the regulatory requirements or best industry practice.

Informative Note 2: The user and supplier may have different level(s) of acceptable risk.

Informative Note 3: A similar phraseology used in some ISO standards is as follows: “#7e risk has been adequately reduced.”

authorized individual: Qualified personnel identified and designated by the user (employer) or supplier to perform a specified task.

awareness device: A barrier, signal or sign that warns individuals of an impending, approaching or present hazard.

barrier: A device or object that provides a physical boundary to a hazard.

control system: Sensors, manual input and mode selection elements, interlocking and decision making circuitry and output elements to the machine actuators, operating devices and mechanisms.

device: A component, attachment or mechanism designed to serve a specific purpose or perform a specific function.

fail-to-safe: A design or event such that a failure or fault within the system causes the hazardous situation to achieve a safe state.

Informative Note: fail-to-safe” is not the same as fail-safe and does not guarantee complete freedom from failure, e.g.” from multiple failures, The term fail-safe is typically used in the process control industry where the process must continue to run or function. Fail-safe is not typically used in the machine tool industry.

guard: A barrier that prevents exposure to a hazard.

Informative Note: See ANSI 811,19 for various types of guards,

harm: Physical injury or damage to the health of people.

Informative Note: Harm may result from direct interaction with the machine, or indirectly as a result of damage to property or to the environment,

Hazard: A potential source of harm.

hazard zone: Any space within and/or around a machine in which a person can be exposed to a hazard. (also hazard area)
interlock: mechanical, electrical, fluid power or other type of device or means to prevent a hazardous situation(s) under specified conditions.

in-running nip point: Any location where a part of the body could be drawn in and injured, between a rotating machine member and another rotating or fixed member, or the material. Also

machinery system: A machine(s) with ancillary equipment such as a material handling system, tool change equipment, ganging, etc. A machinery system may be an integrated manufacturing system (see ANSI 811.20).

maintenance personnel: Qualified personnel trained and authorized to maintain the machine, including the safeguarding.

mechanical power transmission apparatus: The mechanical components that, together with a source of power, provide the motion to an element of a machine or equipment, e.g., shafts, gears, belts, pulleys, couplings.

mode (of operation): The operation of a machine or machinery system as determined by the state or condition of the control system. Specific operating modes are defined in the B 11 base standards and may include the following examples:

  automatic mode: An operating mode that produces continuous cycling, automatically initiated single cycles, or intermittent continuous cycling on an automatic basis.

  continuous mode: Continuous cycling, initiated by an operator, and maintained by the machine control system, without further operator interaction.

  jog/inch mode: To impart motion by momentary manual operation of the jog/inch control device.

    Informative Note: As a function, inch is synonymous with jog. However, inch mode and jog mode are not the same, Traditionally, inch mode uses a clutch to effect motion whereas jog mode uses the motor to effect motion.

  manual mode: Any operating mode of the machine that requires the operator to initiate and/or maintain motion of the machine during the cycle, or portion of the cycle, by use of the actuating control.

    Informative Note: Other manual mode(s) may be developed for a particular machine or task, based on the risk assessment (e.g., single block mode in NC machines, maintenance, or a machine-specific mode to complete a task).

  normal operation: The operating condition where the machine or production system performs the intended production function(s).

  run mode: The operating modes, whether automatic or manual that are used for production operations on a machine. 3.43.7 semi-automatic mode: The operating mode that requires one or more control actions by the operator per machine cycle.

monitoring: The checking of system components to detect a failure of a component, subassembly or module that affects the performance of the safety-related functions.

operator controls: A pushbutton, switch, lever, hand wheel, or other device actuated by the operator that initiates, cycles, controls or stops the motion of a machine

perimeter guarding: A guard or safeguard designed to limit or detect an individual(s) entering a hazardous area after which the individual(s) is not continuously being detected.
programmable electronic system (PES): An electronic system that performs logical, decision making or arithmetic functions by executing instructions in a specified manner. The system usually includes input and output elements (ports) and is usually reprogrammable.

qualified personnel: An individual who, as a result of training and experience, understands and demonstrates competence with the design, construction, operation or maintenance of the machine and the associated hazards.

readily accessible: Capable of being reached quickly without having to remove obstacles or obstructions.

redundancy: The use of multiple means to perform the same function.

repair: To restore a machine by replacing a part or putting together that which is broken without altering its original purpose, function, capacity, operation or safeguarding requirements.

risk assessment: The process by which the intended use of the machine, the tasks and hazards, and the level of risk are determined.

safe-work procedure(s): Formal written documentation developed by the user that describes steps that are to be taken to safely complete tasks where hazardous situations may be present or hazardous events are likely to occur.

safeguarding: Protection of personnel from hazards by the use of guards, safeguarding devices, awareness devices, and safeguarding measures.

safeguarding device: A device that detects or prevents inadvertent access to a hazard. See ANSI B11.19.

Informative Note: This does not include personal protective equipment; (e.g., hand tools, safety glasses/goggles, face shields, safety shoes), See Annex E, Section E2.

service / maintain: Performance of procedures or adjustments described in the supplier manuals, information for use or the user developed planned maintenance procedures which may affect any aspect of machine performance. Examples can include fault diagnosis, equipment strip-down and repairing.

safety mat device: A device, consisting of a sensing surface and control, which detects the presence of an individual(s) on its surface.

two-hand trip: An actuating control that requires the synchronous use of both the operator's hands to initiate a machine cycle. Also referred to as: two-hand trip device. See ANSI 811.19.

Informative Note: Two-hand devices typically cause a full machine cycle and do not issue a stop command if either or both the operator controls are released. When a two-hand trip is utilized as a safeguarding device, it has additional requirements.
stop: Immediate or controlled cessation of machine motion or other hazardous situations. There are many terms used to describe the different kinds of stops, including user- or supplier-specific terms, the operation and function of which is determined by the individual design. Definitions of some of the more commonly used “stop” terminology include:

1 controlled stop: The stopping of machine motion while retaining power to the machine actuators during the stopping process. Also referred to as category 1 or 2 stop (see also, NFPA 79, 9.2.2);
2 emergency stop: The stopping of a machine, manually initiated, for emergency purposes
3 normal stop: The stopping of a machine, initiated by the control system, at the completion of a cycle;
4 protective stop: The stopping of a machine initiated by a safeguarding device for safeguarding purposes. Also referred to as: safety stop;
   Informative Note: This type of stop allows the orderly cessation of motion or the hazardous situation and allows for the retention of program logic to facilitate restarting of the machine. This type of stop includes stop categories 0, 1 and 2 as defined in NFPA 79.
5 stop control: Operator control that, when actuated, initiates an immediate stop command or a stop at a predefined position in a cycle.
6 uncontrolled stop: The stopping of machine motion by removing power to the machine actuators, all brakes or other mechanical stopping devices being activated.

stop command: An action to cause cessation of machine motion either automatically or through human intervention. The stop command can be immediate or normal. See also, immediate stop command, and normal stop command.

immediate stop [stopping] command: A command that initiates an action(s) to stop a hazardous motion (or Situation) at any point in the machine cycle.

normal stop command: A command that initiates an action(s) to stop motion(s) or situation(s) at the end of a machine cycle or at other points required by the machine functions.

stopping performance monitor: A system used to monitor the stopping ability of the machine.