ASCO Power Technologies™

# Withstand and Closing Ratings for Transfer Switch Equipment

## Engineering Application Information

Revision 38

*ASCO products comply with all mandatory UL 1008 withstand and closing ratings.*

*By using the information in this publication and calculating available short circuit currents, the system designer can be assured the transfer switches will be properly rated for the electrical system.*

Schneider Electric

## INTRODUCTION

This publication provides information on withstand and closing ratings (WCRs) for ASCO transfer switches and related products, including compliance with the optional short time ratings and other revisions to UL 1008. Also included are guidelines for special WCR applications and typical methods for specifying WCR requirements.

### Guidelines for using the information in this publication to verify suitability of switches for specific applications based on withstand and closing ratings (WCR).

1. Determine the prospective fault current available (from each source) at the location of the switch.
2. Determine the overcurrent protective devices (OPDs) that will be located ahead of the switch.
3. If the OPD is a circuit breaker, refer to the "Time Based" rating column on Table II of page 4. Select the switch rating necessary to handle the full load current. Compare the fault current available at the switch source terminals to the WCR shown in Table II for the applicable switch ampere size and voltage. If the prospective fault current is equal to or less than the Time Based WCR from Table II, the switch selected is suitable for the application.
4. If the prospective fault current is greater than the Time Based WCR obtained from Table II, refer to the "Specific Breaker" list on Table III on pages 5-7. Compare the fault current to the WCR shown in Table II. If the fault current is equal to or less than the WCR shown in Table II, the switch is suitable for the application when protected by any of the circuit breakers shown. If the specific circuit breaker being used is not shown in the table, contact ASCO Power Technologies.
5. If the prospective fault current is greater than the WCR listed in Table III, refer to *Special Application Considerations* on page 8.
6. When the overcurrent protective devices are fuses refer to the "Current Limiting Fuses" column of Table II on page 4. If there are any questions about the suitability of the switch when protected by current limiting fuses contact ASCO Power Technologies.

## THE IMPORTANCE OF PROPER RATINGS

The transfer switch is a unique and critical part of the power system. It is the last distribution device feeding the critical loads of a facility. For that reason, the transfer switch should be located as close as possible to the protected loads. In addition, after a fault (short circuit) is cleared, the transfer switch must remain operable so that it can restore power to the critical loads from the alternate power source.

In the design of an electrical power distribution system, a coordination study should be conducted during the design stage to determine the trip settings required for all circuit breakers. Proper trip settings will assure that a fault is cleared as close to its location as practical. The coordination study considers conductor sizes, quantities and lengths as well as any other relevant circuit impedance. The farther from the source a device is located, the lower the fault current will be at that device. Referring to Figure 1, a fault at point A should be cleared by the switchgear feeder breaker F2 and not by M. This would leave the other feeder circuits (F1 & F3 - F7) in operation. A coordination study will determine the magnitude of fault current at the load side of the transfer switch and indicate the settings for F2.

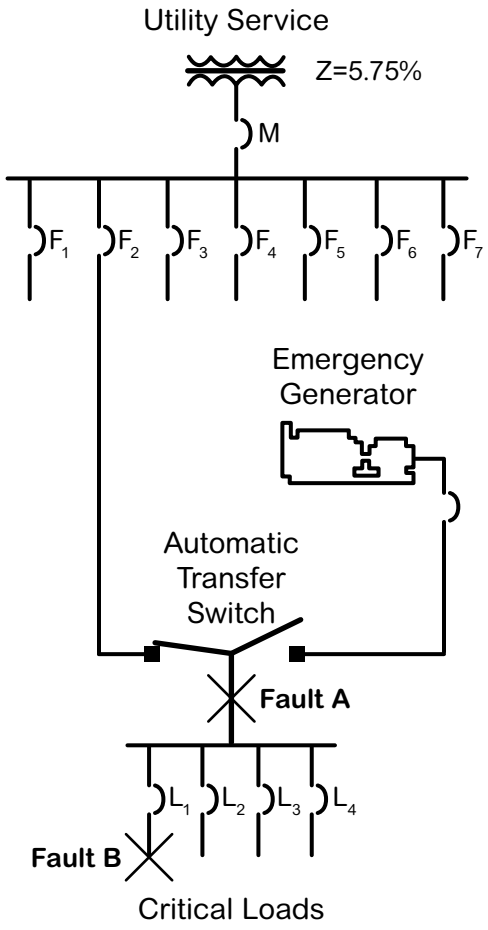



**Figure 1. Line diagram of a typical emergency power system.**

Consider a fault at point B on the load side of the breaker feeding L1 as shown in Figure 1. If the system breakers have been coordinated properly, the breaker feeding L1 will trip before the upstream breaker or fuse. The transfer switch must withstand this fault current until the circuit breaker or fuse clears the fault. Most automatic transfer switches available today have a standard control circuit time delay of 0.5 seconds or more to override any momentary voltage transients. This is ample time for any over current device to clear the fault, allowing system voltage to return to normal and avoiding any unnecessary operation of the transfer switch.

Now consider a fault at point A of Figure 1. The circuit breakers on the load side of the transfer switch would not see the fault current, but the upstream breaker (F2) would and the instantaneous trip element would be actuated. The transfer switch controller senses there is no voltage from the utility, signals a transfer operation and the transfer switch is now required to close on the fault condition until the generator over current device clears the fault.

If a transfer switch does not have a sufficient withstand and closing rating, severe damage and a potential fire hazard could result from the fault current. Over-rating the transfer switch to achieve a sufficient WCR leads to a less cost-effective design. Good engineering practice requires adequately rated devices in the power distribution system. Therefore, the specified WCR for the transfer switch should be equal to or greater than the available fault current at the location of the transfer switch. Some recommended engineering practices to assist in fault current calculations are referenced at the end of this publication.

## HOW CODES IMPACT RATINGS

Codes often require equipment to be approved for its intended use. For example, one of the most common applications for automatic transfer switches is in Emergency Systems per Article 700 of the National Electrical Code (NEC) ANSI/ NFPA 70. Section 700-3 and 700-6 require that all transfer equipment be approved for use on Emergency Systems. How does a manufacturer obtain approval? There are several ways, but perhaps the most common is via a third party certification acceptable to the authority having jurisdiction.

## THE ROLE OF UNDERWRITERS LABORATORIES

Underwriters Laboratories (UL) is one of several independent testing agencies and is perhaps the most well-known third party certifier. The Standard for Safety under which Underwriters Laboratories tests Transfer Switch Equipment is UL 1008. Equipment which meets UL requirements is listed in UL's Electrical Construction Materials List. This list is frequently used by electrical inspectors and other authorities having jurisdiction in conjunction with the device markings and rating label to approve an electrical installation.

UL has issued several revisions to the UL 1008 Standard, which clarify how a transfer switch is to be tested and marked for fault current withstand and closing ratings. A major revision introduced in the 1989 version of UL 1008 allowed an optional rating category for WCR and closing tests. Its purpose was to permit transfer switch manufacturers to conduct tests without overcurrent protective devices. For transfer switches rated 400A and below for use on 10 kA circuit maximum, the on time of the fault current must be at least 25 ms (1½ cycles). For transfer switches rated above 400A or for use on circuits with available fault currents above 10 kA, the on time of the fault current must be at least 50 ms (3 cycles). When this test is successful, the manufacturer may mark the switch for use with any manufacturer's circuit breaker within its rating. Such umbrella ratings give the application engineer more flexibility when specifying and coordinating the transfer switch with overcurrent devices.

Where a transfer switch manufacturer does not opt for this test, the switch can only be marked to show the specific manufacturer's circuit breaker with which the switch was tested, or circuit breakers approved by UL through extension from the original test data. The specific breaker marking can limit the product's application and acceptance by the inspecting authority.

Other issues may develop when the transfer switch WCR is limited to use with specific circuit breakers. Even though a specific breaker is coordinated with the transfer switch upon initial installation, the breaker could possibly be replaced at a later date with another type and/or rating which is not one of the breakers approved by UL. Circuit breakers also change trip characteristics as they age and the tripping time may be become slower, allowing the transfer switch to be subjected to energy above the original short circuit testing values. These issues would not be a concern to the specifying engineer if a transfer switch rated for use with "Time Based" were selected.

Another significant change regarding short circuit testing was made to UL1008 in June of 2002. Since the requirement for selective coordination was added to articles 700, 701 and 708 of the NEC, UL recognized there would be situations where transfer switches would be required to withstand and close on short circuit currents for time durations of 0.1 seconds (6 cycles for 60Hz systems). Consequently, UL added requirements for a new optional short circuit test called "Short Time Current Rating Test". The criteria for a successful test was the same as the short circuit testing in the standard, except the test sample was required to pass a temperature rise test at the conclusion of this new short time test. This meant the transfer switch main contacts had to be virtually "like new" in order to minimize the increase in contact resistance in order to meet the temperature rise limits.

The time duration of the short time test was up to the discretion of the manufacturer and could range from 0.1 to 0.5 seconds. The amount of energy a transfer switch can withstand and close on is based on an I2T function, which is a measurement of the energy handled by the switch. Since the switch has to handle more energy with the longer time duration and also pass a temperature rise test following this event, the short time ratings will be lower for an identical test sample compared to the short circuit ratings obtained for the requirements in UL1008 prior to 2002.

The 7th Edition of UL 1008 became effective November 1, 2014 and resulted in significant changes to the shortcircuit ratings shown on all transfer switch products in the industry. First, the "Any" circuit breaker rating added in 1989 was replaced with a "time based" rating and marking shown in seconds rather than cycles. Generally, these are time durations of 0.025 Sec for short-circuit currents up to 10 kA on switch ratings of 400 amp or less and 0.050 Sec for most other shortcircuit levels.

The most significant change is the way that specific circuit breakers are permitted to be added to the label markings. Specific circuit breakers must be short circuit tested with the transfer switch per UL1008 requirements or can be added based on comparing circuit breaker maximum instantaneous clearing times to the actual time durations of short-circuit tests conducted on the transfer switch. UL has made this change to ensure all manufacturers utilize the criteria described in the 7th edition of UL1008 to qualify circuit breakers for use with transfer switches during short circuit testing of their products.

Unfortunately, this limits the listed population of circuit breakers on the WCR labels of many manufacturers' switches and especially on smaller frame transfer switches, because of the manner in which UL previously evaluated adding circuit breakers to manufacturer's markings. In the past, the listing of specific breakers was based on a comparison of the "published" maximum instantaneous clearing time of the breaker tested to non-tested circuit breakers maximum instantaneous clearing times. 2 The format and appearance of the WCR label was also changed significantly with the addition of more descriptive statements regarding how the ratings should be applied in selecting appropriate over-current protection. An example of these labels is shown on page 8.

## ASCO SWITCHES MEET AND EXCEED UL 1008 REQUIREMENTS

ASCO Power Technologies provides withstand current ratings on its products to provide maximum flexibility to the electrical consultant when specifying these products. The ratings apply to the ASCO products shown in Table I and are specified in Tables II and III. The ratings apply to single phase and three phase switches. The withstand & closing ratings of the overlapping neutral transfer pole is identical to the WCR of the phase switching poles.

See page 8, Special Application Considerations, if ratings beyond those listed are required. Contact ASCO Power Technologies to determine if ratings have been increased or for ratings beyond three cycles which may not be UL Listed, but which are based on other tests.

**Table I. Applicable Products (Refer to Specific Rating Tables for Each Products Rating)**

| ASCO Product | Typical Applications | Product Description | |
|---|---|---|---|
| | | Automatic Transfer Switch | Non-Automatic Transfer Switch |
| Series 165, 185 | Residential | Automatic | Manual |
| Series 300 / 386 | Industrial / Light Commercial | Automatic Transfer Switch<br>(Light Commercial Applications) | Non-Automatic – Electrically Operated Transfer Switch |
| 4000 TS 4000 Series Power Transfer Switches | Industrial, Commercial, Institutional | 4ATS – Automatic Transfer Switch<br>4ACTS – Automatic Closed Transition Switch<br>4ADTS – Automatic Delayed Transition Switch | 4NTS – Non-Automatic Transfer Switch<br>4NCTS – Non-Automatic Closed Transition Switch<br>4NDTS – Non-Automatic Delayed Transition Switch |
| 7000 TS 7000 Series Power Transfer Switches | Health Care, Critical Power Facilities | 7ATS – Automatic Transfer Switch<br>7ACTS – Automatic Closed Transition Switch<br>7ADTS – Automatic Delayed Transition Switch<br>7ASLS – Automatic Soft Load Transfer Switch | 7NTS – Non-Automatic Transfer Switch<br>7NCTS – Non-Automatic Closed Transition Switch<br>7NDTS – Non-Automatic Delayed Transition Switch<br>7MTS – Manually Operated Transfer Switch |
| 7000 TB 7000 Series Transfer Switches with BypassIsolation Feature | Health Care, Critical Power Facilities, Mission Critical | 7ATB – Automatic Transfer Switch with By-pass-Isolation<br>7ACTB – Automatic Closed Transition Transfer Switch with Bypass-Isolation<br>7ADTB – Automatic Delayed Transition Transfer Switch with Bypass-Isolation<br>7ASLB – Automatic Soft Load Transfer Switch with Bypass-Isolation | 7NTB – Non-Automatic Transfer Switch with By-pass-Isolation<br>7NCTB – Non-Automatic Closed Transition Trans-fer Switch with Bypass-Isolation<br>7NDTB – Non-Automatic Delayed Transition Transfer Switch with Bypass-Isolation |

# ASCO UL1008 Withstand and Closing Ratings[1,2,6]
# (RMS Symmetrical Amps)

| Frame | Switch Rating (Amps) | | 300, 4000 & 7000 Series | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Current Limiting Fuses | | | | Specific Breaker | | | Time Based | | | | Short Time Ratings[3] (sec) | | | | | | | |
| | | | | | | | | | | | | | | 480V Max. | | | | 600V Max. | | | |
| | Transfer Switches | Bypass Switches | 480V Max. | 600V Max. | Max Size, A | Class | 240V Max. | 480V Max. | 600V Max. | Time (sec) | 240V Max. | 480V Max. | 600V Max. | .13 | .2 | .3 | .5 | .1 | .13 | .3 | .5 |
| D | 30 | - | 100kA | - | 300 | J | 22kA | 25kA | 10kA | 0.025 | 10kA | 10kA | 10kA | - | | | | - | | | |
| | | | 200kA | 35kA | 200 | J | | | | | | | | | | | | | | | |
| | | | 35kA | 35kA | 200 | RK1 | | | | | | | | | | | | | | | |
| D | 70, 100 | - | 35kA | 35kA | 200 | RK1 | 150kA | 85kA | 25kA | 0.025 | 10kA | 10kA | 10kA | - | | | | - | | | |
| | | | 200kA | 35kA | 200 | J | | | | | | | | | | | | | | | |
| D | 150 | - | 35kA | 35kA | 200 | RK1 | 150kA | 85kA | 25kA | 0.025 | 10kA | 10kA | 10kA | - | | | | - | | | |
| | | | 200kA | 35kA | 200 | J | | | | | | | | | | | | | | | |
| D | 200 | - | 200kA | 35kA | 200 | J | 200kA | 85kA | 14kA | 0.025 | 10kA | 10kA | 10kA | - | | | | - | | | |
| | | | 35kA | 35kA | 200 | RK1 | | | | | | | | | | | | | | | |
| D | 230 | - | 100kA | - | 300 | J | 200kA | 85kA | 14kA | 0.025 | 10kA | 10kA | - | - | | | | - | | | |
| E | 260, 400 | - | 200kA | - | 600 | J | 65kA | 42kA | 22kA | 0.05 | 35kA | 35kA | 22kA | - | | | | - | | | |
| J | 150, 200, 230, 260 | 150, 200, 230, 260 | 200kA | 200kA | 600 | J | 200kA | 200kA | 100kA | 0.05 | 65kA | 42kA[5] | 35kA | 7.5kA | | - | | - | | | |
| | | | | | 800 | L | | | | | | | | | | | | | | | |
| J | 400 | 400 | 200kA | 200kA | 600 | J | 200kA | 200kA | 100kA | 0.05 | 65kA | 42kA[5] | 35kA | 7.5kA | | - | | - | | | |
| | | | | | 800 | L | | | | | | | | | | | | | | | |
| J | 600 | 600 | 200kA | 200kA | 800 | L | 200kA | 200kA | 100kA | 0.05 | 65kA | 42kA[5] | 35kA | 7.5kA[8] | | - | | - | | | |
| | | | 200kA | 200kA | 600 | J | | | | | | | | | | | | | | | |
| H[7] | 600 | 600 | 200kA | 200kA | 1600 | L | 200kA | 200kA | 100kA | 0.05 | 50kA | 50kA | 50kA | 36kA | | | - | 36kA | | | - |
| P[7] | 600 | 600 | 200kA | 200kA | 1600 | L | 200kA | 200kA | 100kA | 0.05 | 50kA | 50kA | 50kA | 36kA | | | 30kA | 36kA | | | - |
| P[7] | 800 | 800 - 1200 | 200kA | 200kA | 1600 | L | 150kA | 150kA | 65kA | 0.05 | 50kA | 50kA | 50kA | 36kA | | | 30kA | 36kA | | | - |
| H | 800 - 1000 | 800 - 1000 | 200kA | 200kA | 1600[4] | L | 150kA | 150kA | 65kA | 0.05 | 50kA | 50kA | 50kA | 36kA | | | - | 36kA | | | - |
| H | 1200 | 1200 | 200kA | 200kA | 1600[4] | L | 150kA | 150kA | 65kA | 0.05 | 50kA | 50kA | 50kA | 36kA | | | - | 36kA | | | - |
| Q[7] | 600-1600 | 600-1600 | 200kA | 200kA | 2000 | L | 65kA | 65kA | 65kA | 0.05 | 65kA | 65kA | 65kA | 50kA | | | | 50kA | | | |
| S[7] | 800 - 1200 | 800 - 1200 | 200kA | 200kA | 2500 | L | 100kA | 100kA | 65kA | 0.05 | 100kA | 100kA | 65kA | 65kA | | | | 65kA | | | |
| G[7] | 1000 - 1200 | 1000 - 1200 | 200kA | 200kA | 2000 | L | 85kA | 85kA | 85kA | 0.05 | 85kA | 85kA | 85kA | - | | | | - | | | |
| G | 1600 - 2000 (Front Connected TS Only) | | 200kA | 200kA | 2500 | L | 85kA | 85kA | 85kA | 0.05 | 85kA | 85kA | 85kA | 42kA | | | 36kA | - | | | |
| G[7] | 1600 - 2000 | 1600 - 2000 | 200kA | 200kA | 3000 | L | 200kA | 200kA | 100kA | 0.05 | 100kA | 100kA | 100kA | 42kA | | | 36kA | 42kA | | | - |
| S[7] | 1600 - 2000 | 1600 - 2000 | 200kA | 200kA | 2500 | L | 100kA | 100kA | 85kA | 0.05 | 100kA | 100kA | 85kA | 85kA | | | 65kA | 85kA | | | 65kA |
| G | 2600 - 3000 | 2600 - 3000 | 200kA | 200kA | 4000 | L | 125kA | 125kA | 100kA | 0.05 | 100kA | 100kA | 100kA | 42kA | | | 36kA | 42kA | | | - |
| G[7] | 3200 | - | 200kA | - | 4000 | L | 100kA | 100kA | - | 0.05 | 100kA | 100kA | - | - | | | | - | | | |
| G | 4000 | 4000 | 200kA | 200kA | 5000 | L | 100kA | 100kA | 100kA | 0.067 | 100kA | 100kA | 100kA | 85KA | 65kA | | | 65kA | | | |
| U[7] | 2600 - 4000 | 2600 - 4000 | 200kA | 200kA | 5000 | L | 125kA | 125kA | 125kA | 0.05 | 125kA | 125kA | 125kA | 100kA | | | | 100kA | | | |

Notes:
1) All WCR values indicated are tested in accordance with the requirements of UL 1008, 7th Edition. See ASCO Pub. 1128 for more WCR information
2) Application requirements may permit higher WCR for certain switch sizes.
3) Short Time ratings are provided for applications involving circuit breakers that utilize trip delay settings for system selective coordination
4) Max fuse rating is 1200A on front connected H frame switches
5) Switches utilizing overlapping neutral (code "C") have 35kA, 0.050 Sec time based rating at 480V Max
6) See ASCO for Service Entrance Switch ratings and 5000A, 6000A Breaker Pair Transfer Equipment
7) These frames are only available on the 7000 Series product
8) Short Time Rating applies to 600A Bypass switch only, the 600A Transfer Switch does not have a Short Time Rating

22-Jul-26

## Table III. Withstand / Closing Ratings for Transfer Switches Used with Specific Manufacturer's Molded Case Circuit Breakers

| ASCO Transfer Switch Product | Transfer Switch Frame Prefix | Transfer Switch Rating (Amps) | WCR / Closing Rating kA RMS Symmetrical Amps | Volts Max | Circuit Breaker Manufacturer | Circuit Breaker Type or Class | Circuit Breaker Rating (Amp Max) Per NEC |
|---|---|---|---|---|---|---|---|
| 300 TS<br>7000 TS | D | 30 | 22 | 480 | GE | THED | 40 |
| | | | 25 | | Siemens | ITE CED6 | 125 |
| | | | 30 | | | 3VA41 | |
| 300 TS<br>4000 TS<br>7000 TS | D | 70 | 150 | 240 | Square-D | HR | 250 |
| | | | 125 | | | HL | 150 |
| | | | 100 | | | BJ, HJ | 125 |
| | | | 65 | | | BG, HG | 125 |
| | | | 42 | | | QG, QJ | 90 |
| | | | 25 | | | HD | 150 |
| | | | | | | BD | 125 |
| | | | 85 | 480 | | HL, HR | 150 |
| | | | 50 | | | BJ | 125 |
| | | | 35 | | | HG, HJ | 150 |
| | | | | | | BG | 125 |
| | | | 18 | | | BD, HD | 125 |
| | | | 30 | | Siemens | 3VA41 | 125 |
| | | | 22 | | GE | THED | 90 |
| | | | 25 | 600 | Square-D | HJ, HL, HR | 150 |
| | | | | | | BJ | 125 |
| | | | 18 | | | HG | 150 |
| | | | | | | BG | 125 |
| | | | 14 | | | HD | 150 |
| | | | | | | BD | 125 |
| | | 100 | 150 | 240 | | HR | 250 |
| | | | 125 | | | HL | 150 |
| | | | 100 | | | BJ, HJ | 125 |
| | | | 65 | | | BG, HG | 125 |
| | | | 42 | | | QG, QJ | 125 |
| | | | 25 | | | HD | 150 |
| | | | | | | BD | 125 |
| | | | 85 | 480 | | HL, HR | 150 |
| | | | 50 | | | BJ | 125 |
| | | | 35 | | | HG, HJ | 150 |
| | | | | | | BG | 125 |
| | | | 18 | | | BD, HD | 125 |
| | | | 30 | | Siemens | 3VA41 | 125 |
| | | | 22 | | GE | THED | 150 |
| | | | 25 | 600 | Square-D | HJ, HL, HR | 150 |
| | | | | | | BJ | 125 |

| ASCO Transfer Switch Product | Transfer Switch Frame Prefix | Transfer Switch Rating (Amps) | WCR / Closing Rating kA RMS Symmetrical Amps | Volts Max | Circuit Breaker Manufacturer | Circuit Breaker Type or Class | Circuit Breaker Rating (Amp Max) Per NEC |
|---|---|---|---|---|---|---|---|
| 300 TS<br>4000 TS<br>7000 TS | D | 100 | 18 | 600 | Square-D | HG | 150 |
| | | | | | | BG | 125 |
| | | | 14 | | | HD | 150 |
| | | | | | | BD | 125 |
| | | 150 | 150 | 240 | | HR | 150 |
| | | | 125 | | | HL | |
| | | | 100 | | | BJ, HJ | 125 |
| | | | 200 | | | JR | 250 |
| | | | 125 | | | JL | |
| | | | 100 | | | JJ | |
| | | | 65 | | | JG | |
| | | | | | | BG, HG | 125 |
| | | | 42 | | | QG, QJ | 200 |
| | | | 25 | | | HD | 150 |
| | | | | | | BD | 125 |
| | | | 85 | 480 | | HL, HR | 150 |
| | | | 50 | | | BJ | 125 |
| | | | 35 | | | HG, HJ | 150 |
| | | | | | | BG | 125 |
| | | | 85 | | | JL, JR | 250 |
| | | | 30 | | | JG, JJ | |
| | | | 18 | | | BD, HD | 125 |
| | | | 22 | | GE | THED | 150 |
| | | | 25 | 600 | Square-D | HJ, HL, HR | |
| | | | | | | BJ | 125 |
| | | | 18 | | | HG | 150 |
| | | | | | | BG | 125 |
| | | | 14 | | | HD | 150 |
| | | | | | | BD | 125 |
| | | 200<br>230 | 200 | 240 | | JR | 250 |
| | | | 125 | | | JL | |
| | | | 100 | | | JJ | |
| | | | 65 | | | JG | |
| | | | 42 | | | QG, QJ | 225 |
| | | | 25 | | | JD | 250 |
| | | | 85 | 480 | | JL, JR | |
| | | | 30 | | | JG, JJ | |
| | | | 18 | | | JD | |
| | | | 14 | 600 | | JD, JG, JJ, JL, JR | |
| 300 TS | E | 260<br>400 | 65 | 240 | GE | THLC4 | 350 |
| | | | 42 | 480 | Cutler Hammer | HMC | 800 |

| ASCO Transfer Switch Product | Transfer Switch Frame Prefix | Transfer Switch Rating (Amps) | WCR / Closing Rating kA RMS Symmetrical Amps | Volts Max | Circuit Breaker Manufacturer | Circuit Breaker Type or Class | Circuit Breaker Rating (Amp Max) Per NEC |
|---|---|---|---|---|---|---|---|
| 300 TS<br>4000 TS<br>7000 TS<br>7000 TB | J | 150<br>200<br>230<br>260<br>400<br>600 | 65 | 240 | GE | THQMV | 225 |
| | | | | | | SGL1, SGL4, SGL6, SGP1, SGP4, SGP6 | 600 |
| | | | | | Cutler Hammer | LDC, CLDC, HLD, CHLD | |
| | | | | | Siemens / ITE | HLD6, HLXD6 | |
| | | | 100 | | Square-D | QG, QJ | 250 |
| | | | | | | HJ (Current Limiting) | 150 |
| | | | | | | JJ (Current Limiting) | 250 |
| | | | | | | LJ (Current Limiting) | 600 |
| | | | 125 | | | HL (Current Limiting) | 150 |
| | | | | | | JL (Current Limiting) | 250 |
| | | | | | | LL (Current Limiting) | 600 |
| | | | 150 | | Siemens / ITE | 3VA41, 3VA51 | 125 |
| | | | 200 | | | 3VA52 | 250 |
| | | | | | | 3VA53 | 400 |
| | | | | | | 3VA54 | 600 |
| | | | | | Square-D | HR (Current Limiting) | 150 |
| | | | | | | JR (Current Limiting) | 250 |
| | | | | | | LR (Current Limiting) | 600 |
| | | | | | Eaton | PD2 (Current Limiting) | 225 |
| | | | | | | PD3 (Current Limiting) | 600 |
| | | 150<br>200<br>230 | 50 | 480 | Cutler Hammer | HFDE, FDC, FDCE | 225 |
| | | | | | | NHH | 250 |
| | | | | | | JDC, JGU, JGX | 350 |
| | | | | | | HKD, CHKD, KDC, HKDB, CHKDB, LHH | 400 |
| | | | | | | HLD, CHLD, LDC, CLDC, LGH*, LGC*, LGU*, LGX* | 600 |
| | | | | | | HMDLB, CHMDLB | 800 |
| | | | | | GE | SEL, SEP | 150 |
| | | | | | | SFL, SFP, FEN, FEH | 250 |
| | | | | | | TBC4 | 400 |
| | | | | | | TJL4V, TJL1S-6S, TBC6, SGL1, SGL4, SGL6, SGP1, SGP4, SGP6, FGN, FGH, FGL, FGP | 600 |
| | | | | | | TB8 | 800 |
| | | | | | Siemens / ITE | HDG, LDG | 150 |
| | | | | | | HFD, HFD6, HFXD, HFXD6, HHFD6, HHFXD6, CFD6, HFG, LFG | 250 |
| | | | | | | HJD, HJD6, HJXD, HJXD6, SHJD, SHJD6, HHJD6, HHJXD6, CJD6, SCJD6, HJG, LJG, LLG | 400 |

| ASCO Transfer Switch Product | Transfer Switch Frame Prefix | Transfer Switch Rating (Amps) | WCR / Closing Rating kA RMS Symmetrical Amps | Volts Max | Circuit Breaker Manufacturer | Circuit Breaker Type or Class | Circuit Breaker Rating (Amp Max) Per NEC |
|---|---|---|---|---|---|---|---|
| 300 TS<br>4000 TS<br>7000 TS<br>7000 TB | J | 150<br>200<br>230 | 50 | 480 | Siemens / ITE | HLD6, HLXD6, HHLD6, HHLXD6, CLD6, SHLD6, SCLD6, HLG | 600 |
| | | | | | Square-D | KC, KI, CF250L, NSF250 | 250 |
| | | | | | | CK400N, CK400NN, CK400H, CK400HH, CJ400L, NSJ400 | 400 |
| | | | | | | LC, DJ, DL, LI, NSJ600 | 600 |
| | | | | | | MasterPact STR 28D, PK | 800 |
| | | | 65 | | | PJ | 1200 |
| | | | 85 | | | PL | |
| | | | 65 | | | HJ (Current Limiting) | 150 |
| | | | | | | JJ (Current Limiting) | 250 |
| | | | | | | LJ (Current Limiting) | 600 |
| | | | 100 | | | HL (Current Limiting) | 150 |
| | | | | | | JL (Current Limiting) | 250 |
| | | | | | | LL (Current Limiting) | 600 |
| | | | 200 | | | HR (Current Limiting) | 150 |
| | | | | | | JR (Current Limiting) | 250 |
| | | | | | | LR (Current Limiting) | 600 |
| | | | 100 | | Eaton | PD2 (Current Limiting) | 225 |
| | | | | | | PD3 (Current Limiting) | 600 |
| | | | | | ABB | XT2L | 125 |
| | | | 65 | | | XT2H | |
| | | | 150 | | | XT2V | |
| | | | 65 | | Siemens | 3VA41 | |
| | | | | | | 3VA51 | |
| | | | 100 | | | 3VA52 | 250 |
| | | | 200 | | | 3VA61 | 150 |
| | | | 42 | 600 | Cutler Hammer | JGU, JGX, JGH | 250 |
| | | | | | | KDC | 400 |
| | | | | | | LDC,CLDC | 600 |
| | | | | | GE | TBC4 | 400 |
| | | | | | | SGL1, SGL4, SGL6, SGP1, SGP4, SGP6, FGP | 600 |
| | | | | | Square-D | KI, CF250L | 250 |
| | | | | | | CK400H, CK400HH, CJ400L | 400 |
| | | | | | | LI, MasterPact STR 28D, PK | 600 |
| | | | | | Siemens / ITE | HJD, CFD6 | 250 |
| | | | | | | HHJD6, HHJXD6, CJD6, SCJD6 | 400 |
| | | | | | | HHLD6, HHLXD6, CLD6, SCLD6, LNG, LPG, LGC*, LGU*, LGX* | 600 |
| | | | 50 | 600 | Square-D | HL (Current Limiting) | 150 |

| ASCO Transfer Switch Product | Transfer Switch Frame Prefix | Transfer Switch Rating (Amps) | WCR / Closing Rating kA RMS Symmetrical Amps | Volts Max | Circuit Breaker Manufacturer | Circuit Breaker Type or Class | Circuit Breaker Rating (Amp Max) Per NEC |
|---|---|---|---|---|---|---|---|
| 300 TS<br>4000 TS<br>7000 TS<br>7000 TB | J | 150<br>200<br>230 | 50 | 600 | Square-D | JL (Current Limiting) | 250 |
| | | | | | | LL (Current Limiting) | 600 |
| | | | 100 | | | HR Current Limiting) | 150 |
| | | | | | | JR (Current Limiting) | 250 |
| | | | | | | LR (Current Limiting) | 600 |
| | | | 65 | | Eaton | PD3 (Current Limiting) | 600 |
| | | | 42 | | ABB | XT2V | 125 |
| | | | 100 | | Siemens | 3VA61 | 150 |
| | | 260 | 50 | 480 | Cutler Hammer | HFDE, FDCE, HFD, FDC, LHH | 225 |
| | | | | | | JDC, JGH, JGC, JGU, JGX | 250 |
| | | | | | | HKD, HKDB, CHKD, CHKDB, KDC | 400 |
| | | | | | | HLD, CHLD, LDC, CLDC, LGH*, LGC*, LGU*, LGX*, NHH | 600 |
| | | | | | | MDL, CMDL, HMDL, CHMDL, NGS, NGH, NGC, MDLB, CMDLB, HMDLB, CHMDLB | 800 |
| | | | | | GE | SFL, SFP, FEN, FEH | 250 |
| | | | | | | TBC4 | 400 |
| | | | | | | TBC6, TJL4V, TJL1S-6S, SGL1, SGL4, SGL6, SGP1, SGP4, SGP6, FGN, FGH, FGL, FGP | 600 |
| | | | | | | TBC8, TKL4V, TKH8S-12S, TKL8S-12S, SKH8, SKL8, SKP8, TB8 | 800 |
| | | | | | Siemens / ITE | HFD6, HFXD6, HHFD6, HH-FXD6, CFD6, HFG, LFG | 250 |
| | | | | | | HJD6, HJXD6, SHJD6, HHJD6, HHJXD6, CJD6, SCJD6, HJG, LJG, LLG | 400 |
| | | | | | | HLD6, HLXD6, SHLD6, HHLD6, HHLXD6, CLD6, SCLD6, HLG | 600 |
| | | | | | | LMD, LMD6, LMXD, LMXD6, HLMD, HLMD6, HLMXD, HLMXD6, MD, MD6, MXD6, HMG, HMD6, HMXD6, SMD6, SHMD6, CMD6, SCMD6, LMG, MG | 800 |
| | | | | | Square-D | KI, KC, CF250L, NSF250 | 250 |
| | | | | | | CK400N, CK400NN, CK400H, CK400HH, CJ400L, NSJ400 | 400 |
| | | | | | | LC, DJ, DL, LI, NSJ600 | 600 |
| | | | | | | CK800N, CK800NN, CK800H, CK800HH, MasterPact STR 28D, MJ, PK | 800 |
| | | | 65 | | | PJ | 1200 |
| | | | 85 | | | PL | 1200 |

| ASCO Transfer Switch Product | Transfer Switch Frame Prefix | Transfer Switch Rating (Amps) | WCR / Closing Rating kA RMS Symmetrical Amps | Volts Max | Circuit Breaker Manufacturer | Circuit Breaker Type or Class | Circuit Breaker Rating (Amp Max) Per NEC |
|---|---|---|---|---|---|---|---|
| 300 TS<br>4000 TS<br>7000 TS<br>7000 TB | J | 260 | 50 | 480 | Square-D | CK1000HL | 1000 |
| | | | | | | CK1200NN, CK1200HH | 1200 |
| | | | 65 | | | HJ (Current Limiting) | 150 |
| | | | | | | JJ (Current Limiting) | 250 |
| | | | | | | LJ (Current Limiting) | 600 |
| | | | 100 | | | HL (Current Limiting) | 150 |
| | | | | | | JL (Current Limiting) | 250 |
| | | | | | | LL (Current Limiting) | 600 |
| | | | 200 | | | HR (Current Limiting) | 150 |
| | | | | | | JR (Current Limiting) | 250 |
| | | | | | | LR (Current Limiting) | 600 |
| | | | 100 | | Eaton | PD2 (Current Limiting) | 225 |
| | | | | | | PD3 (Current Limiting) | 600 |
| | | | 65 | | ABB | XT4H | 250 |
| | | | 100 | | | XT4L | |
| | | | 150 | | | XT4V | |
| | | | 200 | | Siemens | 3VA62 | |
| | | | 42 | 600 | Cutler Hammer | JGU, JGX | 250 |
| | | | | | | KDC | 400 |
| | | | | | | LDC, CLDC | 600 |
| | | | | | GE | TBC4 | 400 |
| | | | | | | TBC6, SGL1, SGL4, SGL6, SGP1, SGP4, SGP6, FGP | 600 |
| | | | | | | TBC8, TKL4V, TKL8S-12S, SKL8, SKP8 | 800 |
| | | | | | Siemens / ITE | HJD, CFD6 | 250 |
| | | | | | | HHJD6, HHJXD6, CJD6, SCJD6 | 400 |
| | | | | | | HHLD6, HHLXD6, CLD6, SCLD6 | 600 |
| | | | | | | HLMD6, HLMXD6, HMXD6, SHMD6, HMD6, CMD6, SCMD6, LMG, LNG, LPG, LGC*, LGU*, LGX* | 800 |
| | | | | | Square-D | KI, CF250L | 250 |
| | | | | | | CK400H, CK400HH, CJ400L | 400 |
| | | | | | | LI | 600 |
| | | | | | | CK800H, CK800HH, Master-Pact STR 28D, PK | 800 |
| | | | 50 | | | HL (Current Limiting) | 150 |
| | | | | | | JL (Current Limiting) | 250 |
| | | | | | | LL (Current Limiting) | 600 |
| | | | 100 | | | HR (Current Limiting) | 150 |
| | | | | | | JR (Current Limiting) | 250 |
| | | | | | | LR (Current Limiting) | 600 |

| ASCO Transfer Switch Product | Transfer Switch Frame Prefix | Transfer Switch Rating (Amps) | WCR / Closing Rating kA RMS Symmetrical Amps | Volts Max | Circuit Breaker Manufacturer | Circuit Breaker Type or Class | Circuit Breaker Rating (Amp Max) Per NEC |
|---|---|---|---|---|---|---|---|
| 300 TS<br>4000 TS<br>7000 TS<br>7000 TB | J | 260 | 65 | 600 | Eaton | PD3 (Current Limiting) | 600 |
| | | | 50 | | ABB | XT4L | 250 |
| | | | 65 | | | XT4V | |
| | | | 100 | | Siemens | 3VA62 | 250 |
| | | 400 | 50 | 480 | Cutler Hammer | JGH, JGC, NHH | 250 |
| | | | | | | HKD, CHKD, KDC, HKDB, CHKDB, LHH | 400 |
| | | | | | | CHLD, LDC, CLDC, LGH*, LGC*, LGU*, LGX* | 600 |
| | | | | | | MDL, CMDL, HMDL, CHMDL, NGS, NGH, NGC, MDLB, CMDLB, HMDLB, CHMDLB | 800 |
| | | | | | | NGU | 1600 |
| | | | | | GE | TBC4 | 400 |
| | | | | | | TBC6, TJL4V, TJL1S-6S, SGL1, SGL4, SGL6, SGP1, SGP4, SGP6, FGN, FGH, FGL, FGP | 600 |
| | | | | | | TBC8, TKL4V, TKH8S-12S, TKL8S-12S, SKH8, SKL8, SKP8, TB8 | 800 |
| | | | | | Siemens/ ITE | HFD6, HFXD6, HFG, LFG | 250 |
| | | | | | | HJD6, HJXD6, SHJD6, HHJD6, HHJXD6, CJD6, SCJD6, HJG, LLG, LJG | 400 |
| | | | | | | HLD6, HLXD6, SHLD6, HHLD6, HHLXD6, CLD6, SCLD6, HLG | 600 |
| | | | | | | LMD6, LMXD6, HLMD6, HLMXD6, MD6, MXD6, HMD6, HMXD6, SMD6, SHMD6, CMD6, SCMD6, HMG, LMG | 800 |
| | | | | | Square-D | CK400N, CK400NN, CK400H, CK400HH, CJ400L, NSJ400 | 400 |
| | | | | | | LC, DJ, DL, LI, NSJ600 | 600 |
| | | | | | | CK800N, CK800NN, CK800H, CK800HH, MJ | 800 |
| | | | | | | CK1000HH | 1000 |
| | | | 65 | | | PJ | 1200 |
| | | | 85 | | | PL | |
| | | | 50 | | | PK, MH, MasterPact STR 28D, CK1200HH | |
| | | | 65 | | | JJ (Current Limiting) | 250 |
| | | | | | | LJ (Current Limiting) | 600 |
| | | | 100 | | | JL (Current Limiting) | 250 |
| | | | | | | LL (Current Limiting) | 600 |
| | | | 200 | | | JR (Current Limiting) | 250 |
| | | | | | | LR (Current Limiting) | 600 |

| ASCO Transfer Switch Product | Transfer Switch Frame Prefix | Transfer Switch Rating (Amps) | WCR / Closing Rating kA RMS Symmetrical Amps | Volts Max | Circuit Breaker Manufacturer | Circuit Breaker Type or Class | Circuit Breaker Rating (Amp Max) Per NEC |
|---|---|---|---|---|---|---|---|
| 300 TS<br>4000 TS<br>7000 TS<br>7000 TB | J | 400 | 100 | 480 | Eaton | PD3 (Current Limiting) | 600 |
| | | | 65 | | ABB | XT5H | 400 |
| | | | 100 | | | XT5L | |
| | | | 150 | | | XT5V | |
| | | | 100 | | Siemens | 3VA53 | |
| | | | 200 | | | 3VA63 | |
| | | | 42 | 600 | Cutler Hammer | KDC | 400 |
| | | | | | | LDC, CLDC, LGC*, LGU*, LGX* | 600 |
| | | | | | GE | TBC4 | 400 |
| | | | | | | TBC6, SGL1, SGL4, SGL6, SGP1, SGP4, SGP6, FGP | 600 |
| | | | | | | TBC8, TKL4V, TKL8S-12S, SKL8, SKP8 | 800 |
| | | | | | Siemens/ ITE | HHJD6, HHJXD6, CJD6, SCJD6 | 400 |
| | | | | | | HHLD6, HHLXD6, CLD6, SCLD6 | 600 |
| | | | | | | HLMD6, HLMXD6, HMXD6, SHMD6, HMD6, CMD6, SCMD6, LMG | 800 |
| | | | | | | LNG, LPG | 1200 |
| | | | | | Square-D | CK400H, CK400HH, CJ400L | 400 |
| | | | | | | LI | 600 |
| | | | | | | CK800H, CK800HH | 800 |
| | | | | | | MasterPact STR 28D, PK | 1200 |
| | | | 50 | | | JL (Current Limiting) | 250 |
| | | | | | | LL (Current Limiting) | 600 |
| | | | 100 | | | JR (Current Limiting) | 250 |
| | | | | | | LR (Current Limiting) | 600 |
| | | | 65 | | Eaton | PD3 (Current Limiting) | 600 |
| | | | 65 | | ABB | XT5L | 400 |
| | | | 100 | | | XT5V | |
| | | | | | Siemens | 3VA63 | |
| | | 600 | 50 | 480 | Cutler Hammer | JGH, JGC, HFG, LFG | 250 |
| | | | | | | HLD, CHLD, LDC, CLDC, LGH*, LGC*, LGU*, LGX* | 600 |
| | | | | | | MDL, CMDL, HMDL, CHMDL, NGS, NGH, NGC, NGU, MDLB, CMDLB, NF | 800 |
| | | | | | GE | TBC6, TJL4V, TJL1S-6S, SGL1, SGL4, SGL6, SGP1, SGP4, SGP6, FGN, FGH, FGL, FGP | 600 |
| | | | | | | TBC8, TKL4V, TKH8S-12S, TKL8S-12S, SKH8, SKL8, SKP8, TB8 | 800 |

| ASCO Transfer Switch Product | Transfer Switch Frame Prefix | Transfer Switch Rating (Amps) | WCR / Closing Rating kA RMS Symmetrical Amps | Volts Max | Circuit Breaker Manufacturer | Circuit Breaker Type or Class | Circuit Breaker Rating (Amp Max) Per NEC |
|---|---|---|---|---|---|---|---|
| 300 TS<br>4000 TS<br>7000 TS<br>7000 TB | J | 600 | 50 | 480 | GE | SKL12, SK12P | 1200 |
| | | | | | Siemens/ ITE | HLD6, HLXD6, SHLD6, HHLD6, HHLXD6, CLD6, SCLD6, HLG LLG | 600 |
| | | | | | | LMD6, LMXD6, HLMD6, HLMXD6, MD6, MXD6, HMD6, HMXD6, SMD6, SHMD6, CMD6, SCMD6, HMG, LMG | 800 |
| | | | | | | HND6, HNXD6, SND6, SHND6, ND6, NXD6, HNG, LNG, CND6 | 1200 |
| | | | | | Square-D | LC, DJ, DL, LI, NSJ600 | 600 |
| | | | | | | CK800N, CK800NN, MJ | 800 |
| | | | | | | MH, CK1200N, CK1200NN, CK1200H, CK1200HH, NT-H, NT-L1, NT-L, NT-LF, PK | 1200 |
| | | | 65 | | | PJ | |
| | | | 85 | | | PL | |
| | | | 50 | | | CM2000HH | 2000 |
| | | | | | | CM2500HH | 2500 |
| | | | 65 | | | LJ (Current Limiting) | 600 |
| | | | 100 | | | LL (Current Limiting) | |
| | | | 200 | | | LR (Current Limiting) | |
| | | | 100 | | Eaton | PD3 (Current Limiting) | |
| | | | 65 | | ABB | XT5H | |
| | | | 100 | | | XT5L | |
| | | | 150 | | | XT5V | |
| | | | 100 | | Siemens | 3VA54 | 600 |
| | | | 200 | | | 3VA64 | |
| | | | 42 | 600 | Cutler Hammer | JGC | 250 |
| | | | | | | TBC4 | 400 |
| | | | | | | LDC, CLDC | 600 |
| | | | | | GE | TBC6, SGL1, SGL4, SGL6, SGP1, SGP4, SGP6, FGP | 600 |
| | | | | | | TBC8, TKL4V, TKL8S-12S, SKL8, SKP8 | 800 |
| | | | | | | SKL12, SKP12 | 1200 |
| | | | | | Siemens/ ITE | HHLD6, HHLXD6, CLD6, SCLD6 | 600 |
| | | | | | | HLMD6, HLMXD6, HMXD6, SHMD6, HMD6, CMD6, SCMD6, LMG | 800 |
| | | | | | | HND6, HNXD6, HNG, LNG, SHND6 | 1200 |
| | | | | | Square-D | LI | 600 |
| | | | | | | CK800H, CK800HH | 800 |
| | | | | | | CK1000HL | 1000 |

| ASCO Transfer Switch Product | Transfer Switch Frame Prefix | Transfer Switch Rating (Amps) | WCR / Closing Rating kA RMS Symmetrical Amps | Volts Max | Circuit Breaker Manufacturer | Circuit Breaker Type or Class | Circuit Breaker Rating (Amp Max) Per NEC |
|---|---|---|---|---|---|---|---|
| 300 TS<br>4000 TS<br>7000 TS<br>7000 TB | J | 600 | 42 | 600 | Square-D | CK1200H,CK1200HH, NT-H, NT-L, NT-LF, NT-L1, MasterPact STR 28D, PK | 1200 |
| | | | 50 | | | LL (Current Limiting) | 600 |
| | | | 100 | | | LR (Current Limiting) | |
| | | | 65 | | Eaton | PD3 (Current Limiting) | |
| | | | 65 | | ABB | XT5L | |
| | | | 100 | | | XT5V | |
| | | | 200 | | Siemens | 3VA64 | |
| | | | | | | 3VA54 | |
| | | | | | | 3VA55 | 800 |
| | | | | | | 3VA56 | |
| | | | | | | 3VA66 | 1000 |
| | H<br>P** | 600<br>800<br>960<br>1000<br>1200 | 65 | 480 | Cutler Hammer | HLD, CHLD, LGH, LGC, LGU, LGX, LDC, CLDC | 600 |
| | | | | | | HMDL, CHMDL, HMDLB, CHMDLB | 800 |
| | | | | | | HND, CHND, NDC, CNDC, NF | 1200 |
| | | | | | | NGH, NGC, NGU | 1600 |
| | | | | | | RGH, RGC | 2500 |
| | | | | | GE | TBC6, TJL4V, SGL, SGP6 | 600 |
| | | | | | | TBC8, SKL8, SKP8 | 800 |
| | | | | | | SKL12, SKP12, TKL4V | 1200 |
| | | | | | Siemens/ ITE | HLXD6, HHLXD6, HHLD6, CLD6, SHLD6, SCLD6, HLG, LLG | 600 |
| | | | | | | HMXD6, HMD6, SHMD6, HMG, LMG, CMD6, SCMD6 | 800 |
| | | | | | | SHND6, CND6, HNXD6, HNG, LNG | 1200 |
| | | | | | | HPG, LPG, HPD, HPD6, CPD6, HPXD, HPXD6, SHPD, SHPD6 | 1600 |
| | | | | | | HRD6, HRXD6 | 2000 |
| | | | | | Eaton | PDG4xM, PDF4xM | 1000 |
| | | | | | | PDG5xM, PDF5xM | 1200 |
| | | | | | Square- D | LI, LE LSI, LE LI, LX, LXI, LJ, LL, LR | 600 |
| | | | | | | MJ, ME, MX, CK800H, CK-800HH | 800 |
| | | | | | | CK1000HL | 1000 |
| | | | | | | NT-L1, NT-L, NT-LF, NE, NX, CK1200H, CK1200HH | 1200 |
| | | | 65 | | | PJ | |
| | | | 85 | | | PL | |
| | | | 65 | | | NW, RJ, RL, MTZ | 1600 |
| | | | | | | PE, PX | 2500 |

| ASCO Transfer Switch Product | Transfer Switch Frame Prefix | Transfer Switch Rating (Amps) | WCR / Closing Rating kA RMS Symmetrical Amps | Volts Max | Circuit Breaker Manufacturer | Circuit Breaker Type or Class | Circuit Breaker Rating (Amp Max) Per NEC |
|---|---|---|---|---|---|---|---|
| | H<br>P** | 600<br>800<br>960<br>1000<br>1200 | 65 | 480 | Square- D | SES, SE, SEH (LS or LSI TRIP) | 3000 |
| | | | | | | SE (LI, LSI-E, and LI-E TRIP) | 4000 |
| | | | | | | MasterPact STR 28D | 6300 |
| 7000 TB | | | 150 | | | MTZ2-16LF1 | 1600 |
| 300 TS<br>4000 TS<br>7000 TS<br>7000 TB | | | 65 | | ABB | Formula A | 250 |
| | | | | | | XT5H | 600 |
| | | | | | | XT6H | 800 |
| | | | 65 | | | XT7H | 1200 |
| | | | 100 | | | XT5L | 600 |
| | | | 150 | | | XT5V | |
| | | | 100 | | Siemens | 3VA54 | 600 |
| | | | | | | 3VA55 | 800 |
| | | | | | | 3VA65 | |
| | | | | | | 3VA66 | 1000 |
| | | | 200 | | | 3VA64 | 600 |
| | | | 65 | | | 3VA57, 3VA67 | 1200 |
| | | | 65 | 600 | Cutler Hammer | TRI-PAC NB | 800 |
| | | | | | | RDC | 2500 |
| | | | | | Siemens/ ITE | CND | 1200 |
| | | | | | ABB | XT5L | 600 |
| | | | 100 | | | XT5V | |
| | | | | | Siemens | 3VA64 | |
| 300 TS[1]<br>7000 TS[1]<br>7000 TB | G | 1600<br>2000<br>2600<br>3000 | 125 | 480 | Square-D | MTZ2/3-L | 3000 |
| 7000 TB | | | | | | Master Pact NW-L | |
| 7000 TS[1]<br>7000 TB | | 1600<br>2000 | 150 | | | MTZ2-LF | 2000 |
| | | | 200 | | | MTZ2-L1/L1F | |

| |
|---|
| *: With Digitrip 310+ LS or LSG Inst. Override set to 12X |
| **: P Frames only available as 7000TS and 7000TB |
| Note 1: Rear Connected Only |

## Additional Manufacturer Ratings

| Products | Short-Circuit Current (RMS SYM AMPS X 1000) | Voltage (VOLTS AC) MAX | Time Duration (SEC) MAX |
|---|---|---|---|
| J Frame TS/TB | 52 | 480 | 0.031 |
| | 42 | 600 | 0.029 |
| H, P Frame TS/TB | 65 | 480 | 0.043 |
| | 65 | 600 | 0.016 |

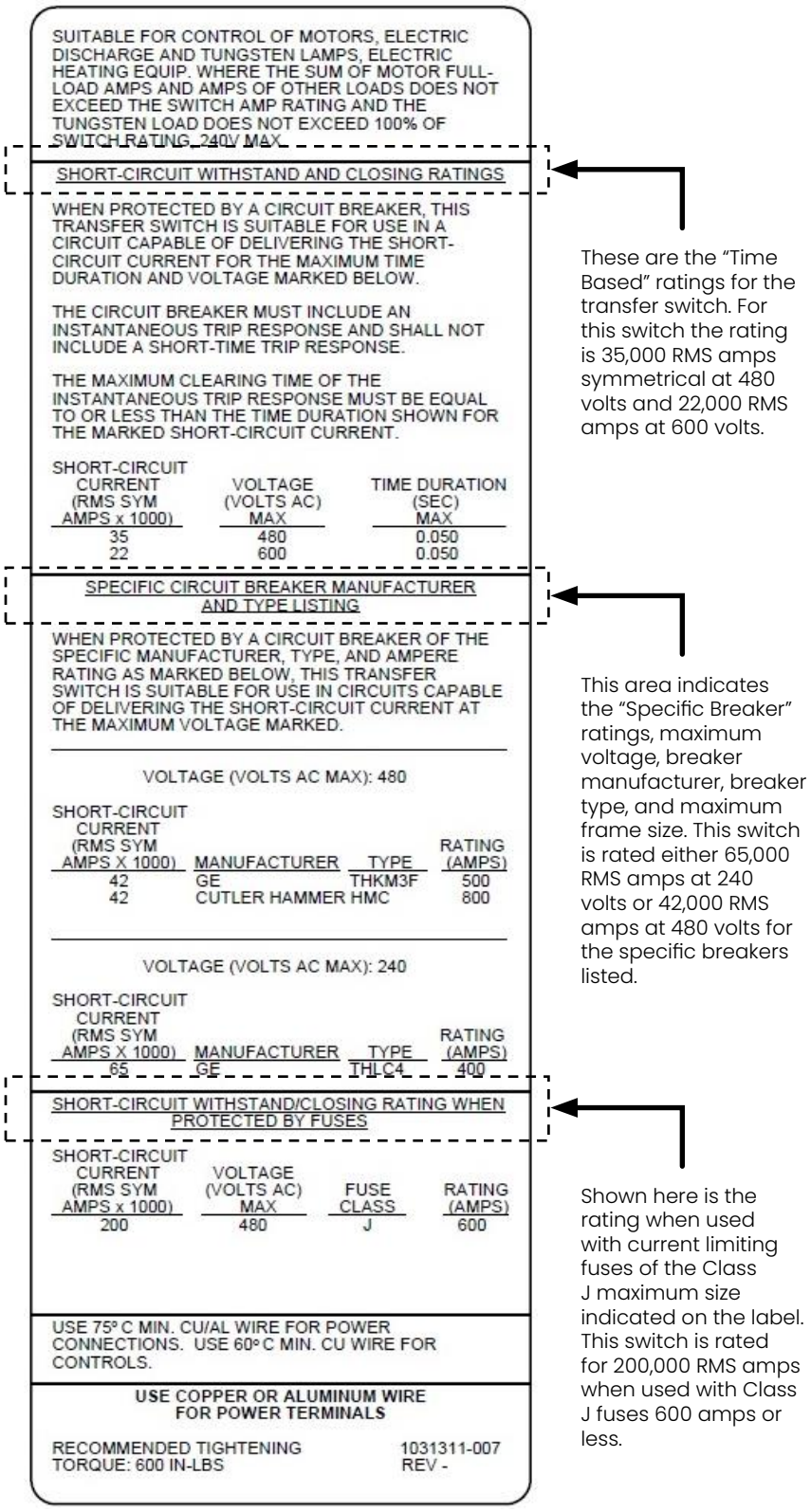



**Figure 2. Typical rating label for ASCO 400 amp Transfer Switch.**

## MARKING REQUIREMENTS

UL requires markings on each switch listing the approved short circuit ratings for each product and its ampacity. ASCO switches display rating labels similar to the one shown in Figure 2. would leave the other feeder circuits (F1 & F3 - F7) in operation. A coordination study will determine the magnitude of fault current at the load side of the transfer switch and indicate the settings for F2.

## SPECIAL APPLICATION CONSIDERATIONS

ASCO Power Technologies provides a line of switches which are highly reliable, utilize latest technology, include features most frequently used by the consulting engineer, and which are rated to meet a wide variety of requirements. For special applications, such as when higher ratings or longer withstand times are needed, the system designer can consider several rating alternatives:

1. Consider relocating the switch closer to the load where the added impedance of the feeder conductors will reduce the available fault current to an acceptable level. This is consistent with good engineering practice of locating transfer switches as close to the load as possible in order to minimize the risk of conductor failures between the load side of the switch and the utilization equipment.
2. Use current limiting fuses or current limiting circuit breakers to reduce fault currents.
3. Use a larger ampacity switch with a higher withstand/closing rating.
4. When the overcurrent protective device ahead of the transfer switch has a clearing time exceeding three cycles, a zone selective interlocking scheme may be considered. Such a scheme permits intentional delays to be over-ridden and the breaker to trip instantaneously whenever the fault is within the breaker's zone of primary protection.
5. Contact ASCO Power Technologies to determine if additional ratings are available.

## HOW TO SPECIFY WITHSTAND AND CLOSING RATINGS

Calculated values of available fault current should be specified for each transfer switch based on its location in the electrical system. This will assure that a properly rated switch will be applied and avoid specified ratings which are too low for the actual location (resulting in an unsafe practice or ratings which are too high (resulting in unnecessarily higher costs).

A growing number of specifying professionals are adding fault current withstand and closing current tables to the electrical plans showing the calculated values for each switch. A typical arrangement is shown in Table IV.

**Table IV. Typical Listings of Transfer Switch Fault Current Ratings on an Electrical Plan**

| Transfer Switch Ident. No. | No. of Poles | Switched Neutral Y/N | Transfer Switch Ampacity | System Voltage | Calculated Fault Currents | | Type of OCD |
|---|---|---|---|---|---|---|---|
| | | | | | RMS Sym. Amperes | X/R Ratio | |
| ATS-E8 | 4 | Y | 260 | 480/277 | 29,000 | 2.3 | MCCB |
| ATS-E9 | 3 | N | 400 | 480 | 33,000 | 2.3 | MCCB |
| ATS-LS1 | 4 | Y | 100 | 480/277 | 7,300 | 2.1 | MCCB |
| ATS-LS2 | 4 | Y | 150 | 480/277 | 8,900 | 2.4 | MCCB |
| ATS-EQ1 | 3 | N | 1000 | 480 | 48,000 | 3.2 | MCCB |

## IMPORTANCE OF X/R RATIO

The circuit reactance to resistance ratio (X/R) is a determinant in preparing fault current studies. Consideration should be given to the X/R ratio at each transfer switch location. The actual X/R ratio should not exceed the X/R ratio at which the transfer switch was tested. Table V shows the power factor test requirements of UL 1008 with equivalent X/R ratios. If an application requires higher X/R ratios, consider the Special Application Considerations previously discussed or consult ASCO Power Technologies for a recommendation. By using the information in this publication and calculating short circuit currents, the system designer can be assured that the transfer switches will be properly rated for the electrical system.

**Table V. UL Maximum Test Factor with Equivalent X/R Ratio**

| Available Fault Current (amperes) | Maximum Test Power Factor | Equivalent X/R Ratio |
|---|---|---|
| 10,000 or less | 0.50 | 1.73 |
| 10,001 – 20,000 | 0.30 | 3.18 |
| greater than 20,000 | 0.20 | 4.90 |

## SUGGESTED FAULT CURRENT STUDY REFERENCE GUIDES


1. The Institute of Electrical and Electronics Engineers, Inc., IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems, IEEE Buff Book, ANSI/IEEE Std. 242-1986, New York, N.Y., pp. 45-113.

2. The Institute of Electrical and Electronics Engineers, Inc., IEEE Recommended Practice for Electric Power Distribution for Industrial Plants, IEEE Red Book, ANSI/IEEE Std. 141-1993, New York, N.Y., pp. 109-184.

3. The Institute of Electrical and Electronics Engineers, Inc., IEEE Recommended Practice for

4. Power System Analysis, IEEE Brown Book, ANSI/IEEE Std. 399-1990, New York, N.Y., pp. 171-194. The Institute of Electrical and Electronics Engineers, Inc., IEEE Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications, IEEE Orange Book, ANSI/IEEE Std. 446-1995, New York, N.Y., pp. 175196.

5. The Institute of Electrical and Electronics Engineers, Inc., IEEE Recommended Practice for Electric Systems in Health Care Facilities, IEEE White Book, ANSI/IEEE Std. 602-1996, New York, N.Y., pp. 50-51; 72-74.

6. Frank W. Kussy and Jack L. Warren, Design Fundamentals for Low-Voltage Distribution and Control, Marcel Dekker Inc., pp. 104-117, 1987.

7. Hermann W. Reichenstein, Applying Low-Voltage Fuses-Classes and Characteristics, McGraw-Hill Inc., 1979.


In addition to the above, most manufacturers of overcurrent protective devices can provide application data on calculating short circuit currents. Various software packages are also available to assist the application engineer in performing calculations by computer.

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